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C. Darwin

Oct^r 1841 -



Harry Soane, 1882.

WHEAT

By JOHN LA CROIX, Esq.

Author of "The History of the Wheat Trade in the United States," &c.

NEW YORK: PUBLISHED BY J. M. LADD, 15 NASSAU ST.

1852

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ON THE
VARIETIES,
PROPERTIES, AND CLASSIFICATION,
OF
W H E A T.

By JOHN LE COUTEUR, Esq.

CAPTAIN H. P. LATE 104TH REGT.; COLONEL 1ST. REGT.
ROYAL JERSEY MILITIA; AIDE DE CAMP TO THE QUEEN.

“ Much food is in the tillage of the poor: but there is *that* is
destroyed for want of judgment.”

JERSEY :

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OF THE
VARIETIES
PROPERTIES AND CLASSIFICATION
OF
WHEAT

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CORRIGENDA,

Page 21.—In the last line, after one, read *ounce*.

“ 23.—Line one, for failed, read *died*.

“ 103.—Line 7, ellicers, read slicers.

DEDICATION
TO THE
CENTRAL AGRICULTURAL SOCIETY
OF
GREAT BRITAIN AND IRELAND.

GENTLEMEN,

Having had the honor and great gratification of assisting in the formation of your Society, which I do not hesitate to call one of the corner stones of the empire; having also witnessed with admiration, so many individuals of various political opinions, setting them aside to unite for the common interests of Agriculture, which, unfortunately, is too clearly proved to be a business of loss; I consider it becomes us all to work for the common good, and endeavour to assist the farmer, in such a way as may tend to extricate him from his difficulties.

It would be great, nay, unmeasured presumption indeed, if so humble and unknown an individual as myself were to venture to assert, that the means he recommends will effect that object; but it may be reasonable to say, that it is believed they will be a first step towards it, since any improvement in culture, which may enable a man to better his condition, is in

fact a pace gained towards the end in view. There are other considerations of far deeper import, which it would ill become me to touch upon, on this occasion ; but if the unassisted labours of one individual of your Committee, may lead to great and important results, relating to that first of products, Wheat ; and that investigations establish his conclusions to have been correct ; it is hoped he will have merited your approbation.

To you, Gentlemen, the great, I wish I could say the *whole* body of Farmers of the United Kingdom, I dedicate this little work, the result of five years of close attention and research.

Several of you inspected the collection of one hundred and three varieties of Wheat, which I exhibited at the Committee Room, these are now increased to upwards of one hundred and fifty sorts.

That among these varieties, there are some that will thrive better than others, in the particular soils and situations adapted to each, all over the kingdom, is my firm belief. That one ear of a superior variety, sowed grain by grain, and suffered to tiller apart, produced four pounds four ounces of wheat ; whereas another ear, of an inferior sort, treated in the same manner, produced only one pound ten ounces ; is a proof that it is of paramount importance to select the most productive and farinaceous sorts for seed. It being obvious, that a farmer who would have sown

his whole crop with the last named variety, would have probably been ruined, whereas, the superior variety would have enabled him to farm with profit.

It is to the consideration of this general proposition, that I now invite your attention, not to view it as a specimen of literary labour, with the eye of criticism, but as the mere statement of one, who hopes he may not have laboured in vain, for the interest of those whom he considers the true sinews of the land,—its farmers. It is hoped it may lead to more extended and improved researches, in every county and province of the empire, as its principle extends to every cultivator of wheat throughout the universe.

The writer had the honor to receive the following encouragement, from the venerable and much to be regretted Father of Modern Agriculture, the Right Honorable Sir John Sinclair, on exposing his views to him.

“My Dear Sir,

“I had the pleasure of receiving your obliging communication from Belle Vue. It contains much important information. The plan you describe, seems to be judiciously formed. I should be very glad, therefore, to see such an excellent system established also in this country; but ever since the extinction of the Board of Agriculture, which cost me so much trouble to establish, and so much exertion to carry on, I have lost all hopes of seeing Agriculture again, placed in that splendid and flourishing state which it then exhibited.

“I hope, however, that this will not discourage you from continuing your exertions, the success of which I trust you will have the goodness, from time to time, occasionally to communicate to me.

“With my best wishes for your success, in the important pursuits, with which you are so laudably occupied.

“I remain, dear Sir,

To Colonel Le Couteur,

&c. &c. &c.

“Very faithfully your’s,

(Signed) “JOHN SINCLAIR.”

With this encouragement from a Philosopher of the most benevolent mind and extended knowledge, who had proved himself the farmer's friend and guide, I determine to submit my work to your favorable consideration, beseeching you to make allowances for the production of an unlettered soldier, who has for the last twenty years turned his "sword into a ploughshare," but who courts the deepest enquiry into a most important subject.

I have the honor to be,

Gentlemen,

Your very faithful and obedient Servant,

J. LE COUTEUR.

INTRODUCTION.

It requires some apology and some sort of introduction from a person wholly unknown to Agriculturists, when he rashly, it would seem, tells them, that the proper culture of wheat, is unknown, or unpractised. An apology is easily made, the only object of the writer being to become useful in the most unobtrusive manner, by endeavouring to better the condition of every cultivator of wheat; and for an introduction he has only to use a greater name, that of Professor La Gasca, Curator of the Royal Gardens at Madrid, whose extensive collections of the varieties of wheat, and botanical researches into its nature as a plant, chiefly scientific and theoretical, led the author to make practical experiments, on the growth and properties of wheat as a nutriment, which have already led to important results.

To the Professor, I owe a great and lasting debt of gratitude, for having drawn my attention to the subject. Five years since, I accidentally saw with astonishment and pleasure, about eighty distinct sorts of wheat growing in a nursery garden in Jersey; some seven feet high, some only four; the ears of some three inches long, others six. Professor La Gasca,

whose they were, happened to join me, and though a stranger, he politely explained their nature to me.

I requested him to visit my crops the following day; I considered them as pure, at least as unmixed as those of my neighbours; when to my dismay, he drew from three fields, three and twenty sorts—some white wheat, some red, some liver-coloured, some spring wheat; some dead ripe, the corn shaking out, some ripe, some half so, some in a milky state, and some green.

I reflected on the subject, and immediately became convinced that no crop in that state, could either produce the greatest weight of corn, give the largest quantity of flour, or make the best or lightest bread, such as would be produced from a field, in an equal and perfect state of ripeness.

I directly conceived a plan, to endeavour practically to ascertain, the relative properties of the best and most productive sorts of wheat; I requested Professor La Gasca to shew me those which he considered the best. He pointed out fourteen sorts: these I grew with extreme care, in the mode that will be described hereafter.

When the Professor saw the drift and result of my comparative experiments, he exclaimed: "Is it possible that in one twelvemonth you have practically obtained the knowledge of what I have been for five and twenty years studying botanically; but, perse-

He has
combined
the
different
varieties
of wheat

vere, with diligence and courage, you will yet work out some great benefit for your country, and for mankind."

It is to the prosecution of these researches, after five years of close application, that I desire to call the attention of the agricultural world. I will frankly say, that all I advance is to be received with caution; that if experiments are to be made on the suggestions which I shall throw out, they should first be, on a small scale, not blindly run into, as if all I state were to be received as a certainty. The results to be obtained in agricultural experiments are necessarily slow, nearly a whole twelvemonth must elapse, before the seed which has been put into the ground, will be convertible into bread—the only valuable proof of the experiment. It is, therefore, by slow approaches, that we shall arrive at the perfect knowledge of a result, which, it is believed, will be most important in itself, and most valuable to all intelligent, industrious, and persevering farmers.

The great first principle I wish to advocate, is the proper adaptation of varieties of wheat, to the various soils and climates, since it is the suitableness of each sort to each soil, that will enable the farmer to pay the rent of his land, by sowing one variety, where, he would be unable to do so, by attempting to grow another of a seemingly better sort.

If this end can be obtained, the object I have had

in view will be realised ; the farmer will be placed in a better situation than he is now ; the productiveness of the soil will be enormously increased, inasmuch as many unproductive lands may be made to grow wheat suited to them, under a proper rotation of cropping, and clean husbandry ; this last, I hold to be indispensable under all circumstances.

If I am fortunate enough generally to convince Agriculturists, that I have advanced facts ; and have carried conviction to their minds ; the cultivation of the most farinaceous wheats, white, red, yellow, or liver-coloured, each suited to their peculiar soils, will become a science, not unworthy, I deem it, the attention of the Government of this or any other country : and a national experimental farm, for the establishment of such researches, might be properly placed under the control of the Chancellor of this and every other Government.

The slow results attainable, only as I have before stated, at the expiration of a twelvemonth, conducted by a single individual, at considerable expense, much employment of time, some uncertainty, arising from occasional absence ; how useful soever, could not be compared with the utility of a national establishment, founded for the purpose of quickly ascertaining such important facts, where the results of many years of application by one person, would be attained in one or two seasons.

CHAPTER I.

WHEAT,—ITS ORIGIN AND VARIETIES.

It is not the intention to write an elaborate treatise on this subject, which, although interesting to the learned and scientific reader, would be of no practical utility to the farmer. It may, nevertheless, not be wholly uninteresting to look back a little into the history of wheat.

We learn from the sacred volume, that it was of the earliest culture, “*In the sweat of thy face shalt thou eat bread.*” It is therefore to be presumed that wheat was coeval with the creation ; and that upwards of a thousand years before the christian era, some improvement in its culture, and some knowledge of a superior variety, had been attained, by the circumstance of its being stated, that “Judah traded in wheat of *Minnith*,” perhaps meaning that such wheat of Minnith, was held to be in superior estimation. This may be the most ancient designation for any particular growth of wheat, the superiority of which, at that early period had engaged public attention. Columella, who wrote about the time of our Lord, makes some interesting remarks on wheat. “The chief
“and the most profitable corns for men, are common

“ wheat, and bearded wheat. We have known several kinds of wheat ; but of these we must chiefly sow what is called the red wheat, because it excels both in weight and brightness.

“ The white wheat must be placed in the second rank, of which the best sort in bread is deficient in weight.

“ The trimestrian shall be the third, which husbandmen are mighty glad to make use of; for when, by reason of great rains, or any other cause, the early sowing has been omitted, they have recourse to this for their relief ; it is a kind of white wheat. Pliny says, that this is the most delicious and the daintiest of any sort of wheat, exceeding white, but without much substance or strength, only proper for moist tracts of land, such as those of Italy, and some parts of Gaul ; that it ripens equally, and that there is no sort of corn that suffers delay less, because it is so tender, that such ears of it that are ripe presently shed their grains ; but in the stalk, it is in less danger than any other corn, for it holds its ear always upright, and does not contain the dews, which occasion blasting and mildew.

“ The other sorts of wheat are altogether superfluous, unless any man has a mind to indulge a manifold variety, and a vain glorious fancy.

“ But, of bearded wheat, we have commonly seen four sorts in use ; namely, that which is called

“ Clusinian, of a shining, bright, white colour ; a
 “ bearded wheat, which is called Venuculum, one
 “ sort of it is of a fiery red colour, and another sort
 “ of it is white ; but they are both heavier than the
 “ Clusinian. The Trimestrian, or that of three
 “ month’s growth, which is called Halic astrum ; and
 “ this is the chief, both for its weight and goodness.
 “ But these sorts, both of ordinary common wheat,
 “ and of bearded wheat, must, for these reasons, be
 “ kept by husbandmen, because it rarely happens
 “ that any land is so situated that we can content
 “ ourselves with one sort of seed, some part of it
 “ happening, contrary to our expectation, to be wet
 “ or dry. But common wheat thrives best in a dry
 “ place, and bearded wheat is less affected by mois-
 “ ture.”

Hence it appears, the Romans were aware of the propriety of selecting their wheat, and that it was then believed, that winter or beardless wheat was best suited to dry uplands, and bearded wheat to low, or moist lands.

In addition to the winter wheats, some of which he states to be bearded, he distinctly alludes to Trimestrian, or spring wheat, of which I shall speak hereafter.

In Gerard’s Herbal, printed in London, 1660, only five kinds of wheat are enumerated, which are thus spoken of:—

“ 1. *Triticum Spicâ Muticâ*, white wheat. This kind of wheat, which Lobelius, distinguishing it by the eare, calleth *Spicâ Muticâ*, is the most principal of all other, whose eares are altogether bare and naked, without awnes, or chaffie beards.

“ 2. The second kind of wheat, in root, stalkes, joints, and blades, is like the precedent, differing onely in eare, and number of graines, whereof this kinde doth abound, having an eare consisting of many ranks, which seemeth to make the eare double or square. The root and grain is like the other, but not bare and naked, but bristled or bearded, with many small and sharp eiles, or awnes, not unlike to those of barley.

“ 3. Flat wheat is like unto the other kindes of wheat, in leaves, stalkes, and roots; but is bearded and bordered with rough and sharp eiles, wherein consists the difference. (I know not what our author means by flat wheat, but I conjecture it to be the long rough eared wheat, which hath blueish eares when it is ripe, in other things resembling the ordinary red wheat.)

“ 4. The fourth kinde is like the last decribed, and thus differeth from it, in that this kind hath many eares, coming forth of one great eare, and the beards hereof be shorter than of the former kinde.

“ 5. Bright wheat is like the second before decribed, and differeth from it in that this kinde is four square, somewhat bright and shining, the other not.

“ I think it a very fit thing (he states in a note) to adde in this place a rare observation, of the transmutation of one species into another, in plants ; yet none that I have read have observed, that two several graines, perfect in each respect, did grow at any time in one eare : the which I saw this yeare 1632, in an eare of white wheat, which was found by my very good friend Master John Goodyer, a man second to none in industrie and searching of plants, nor in his judgment or knowledge of them. This eare of wheat was as large and faire as most are, and about the middle thereof grew three or foure perfect oats in all respects : which being hard to be found, I held very worthy of setting downe, for some reasons, not to be insisted upon in this place.”

He also entertained the opinion, that, wheat “ *in a moist and darke soile, degenerateth sometime to be of another kinde.*”

The singular fact mentioned above, relates to the chapter on the disposition of wheat to sport ; but I have copied it as I found it. I principally wished to show how few varieties were then known, and how indistinctly they were described.

Modern writers have merely designated a number of varieties, but no attempt appears to have ever been made to class them correctly, or to ascertain their relative values by comparison.

In Sinclair’s “ Hortus Gramineus Woburnensis,”

forty-two of the cultivated varieties are enumerated, as winter or spring wheats, according to the arrangement of Linneus, which this illustrious writer, has merely given as a sort of botanical classification. The *Maison Rustique*, for 1835, enumerates thirty-nine varieties ; and although a short notice is given of them, it is by no means sufficient, as their farinaceous qualities are not explained, nor is the classification, according to Professor La Gasca's notions, as he called all bearded wheats, spring wheats ; though he admitted many of them would be increased in produce, by being sown as winter wheats, and that many winter wheats might be made as late, and produce as much as spring wheats.

It is a classification of wheat, pointing out the relative value, of varieties ; in their quantity of meal, the weight of bran and pollards, with the weight of straw of each, and their adaptation to soils, which is now required.

That this would be a desideratum, no one I imagine will deny ; but that it requires time, attention, and perseverance, to make such discoveries, will also be conceded, when it is stated that I already possess upwards of one hundred and fifty varieties, or sub-varieties.

CHAPTER II.

FAULTS IN ORDINARY PRACTICE.

It may be useful, first to point out the defects, in the present practice of husbandry with respect to wheat. The usual mode, with the best farmers, is to purchase seed corn, where it is supposed to be clean, and pure, by the last expression, meaning wheat of one sort, or as little mixed as possible. But the ordinary practice, with those who may be said to supply the nation, is to procure seed wheat, where it can be got cheapest, without regard to mixture or purity, provided the sample is good, and appears likely to grow; others do worse, and imagine, that poor lean shrivelled wheat, the refuse of their own stock, or some coming from a distance, as a change; is all that is required to ensure a crop. Other carelessness, previous to, or after culture, need not here be treated of, as that would equally affect the best, as well as the worst seed. One observation it would be well to make now, that the old practice of putting fresh manure to land intended for wheat, is decidedly dangerous, inasmuch as it tends to produce much grass or straw, and less grain, which grain is also of a dark and

coarse nature. Stable dung should be applied plentifully to the preparatory crop, and when lime or ashes are not procurable for the wheat crop, the early and free use of the hoe will supply their loss in a great measure ; but none save decomposed stable dung should be applied to wheat, if that manure be necessary. This is merely stated as a general observation, as there may be soils which, without manure, would be wholly unproductive. The experience of the writer being at present chiefly limited to what are commonly held to be good soils.

The writer, in 1831, thought his crops were tolerably pure, yet on Professor La Gasca walking through them, as he has stated in the Introduction, he selected from them twenty-three sorts, of which, some have since been discovered to be three weeks later in ripening, than others. Hence, I repeat, it must be obvious, that corn harvested in an unequal state of ripeness, cannot be the best for the purpose of making bread,—when the greater part of the grain has been reaped in the state, the farmer considered was fittest for the miller ; whilst the lesser part has been either in a milky state, or much over ripe, or some in states, between both.

It must be obvious, that the greatest quantity of farina or meal, is not obtained from wheat reaped in this manner ; the largest quantity would be obtained, when every ear produced that

fine, plump, thin-skinned, coffee-like looking grain which evidently contains much meal, in a delicate, transparent, thin-coated bran, such as some Dantzic, selected from the *high-mixed* produces.

Hence it is assumed, that to have the best bread from any variety of wheat, is to have it so pure, that, supposing it to be grown on a level space, with one exposition, it will all ripen at the same time; slight differences being allowed for variation of soil, sub-soil, or accidental unequal distribution of manure; but, speaking generally, it will ripen equally. Such variety, therefore, having ripened alike, will probably, if grown on the good Kentish, Essex, Devonshire, or other soils specially adapted to the growth of corn, be (if reaped at the proper moment) in that exact state of plump, round form, which promises the greatest quantity of flour.

I must here observe, that the cause why so much wheat appears to have many shrivelled, lean, ill-grown grains in it, arises often from the unequal growth of the many varieties that lurk in the purest crop.

Much has been judiciously written on the growth and cultivation of wheat, which has tended to a material improvement in those farms where care has been taken, perceptible even to superficial observers; but no writer has yet called the attention of the agricultural world to the cultivation of pure sorts, originating from one single grain. It is contended that this

has been the root of all the evil ; many have attempted to begin well, but few if any have thought of commencing from the original, and persevering in keeping it pure.

This idea struck the author so powerfully, on the first conversation he had with Professor La Gasca, that it has never quitted him. His project was considered visionary and unattainable. Old farmers said, that as no farmer in the world had ever thought of separating and classing wheat, it could not be done, it was impossible to get a pure crop ! The bees would mix the farina, mice would mix the grain, birds would do the same ; if it had been feasible, it would have been tried before. Corn factors assured him that the climate of England was not calculated for the growth of such fine-skinned wheat as that of Dantzic, Volhynia and Sandomir. Professor La Gasca alone perceived and approved of the author's project.

The learned Professor had been theoretically employed in the classification and scientific examination of wheat as a plant, in the research and consideration of all its varieties ; but it had escaped him to consider it in its properties, with relation to the food of man. This practical view the author took of it, and he determined to attempt to discover which were the most farinaceous and productive varieties, by comparing their characters and produce, one with another.

CHAPTER III.

ON THE CHOICE OF SEED.

THE usual mode, with the generality of farmers, is to procure any seed, that any neighbour, enjoying the reputation of being a good farmer, may have to sell. A more intelligent class take care to procure their seed from a distance, to require that it is fine, perhaps even pure ; they also have thought of changing or renewing their seed occasionally. A still more intelligent number having procured the best seed they could obtain, of those sorts which observation, and experience, have led them to know as being best suited to their soil and climate, have further observed, that mixtures in their crops prevented their ripening at the same moment, and have endeavoured to remedy this defect, by making selections by hand, of those varieties which appeared to them to be similar, and thus have greatly, and manifestly, improved their crop in produce and quality.

A few farmers have proceeded a step further, and from having observed a stray ear of apparently unusually prolific habits, have judiciously set it apart,

and have raised a stock from it. Hence the Hedge Wheat, Hunters, Hicklings, and twenty more, that might be named; but it is contended that it is not sufficient, merely to have grown them pure for a short time; it is necessary to keep them permanently so, if after a comparative examination, as to their relative produce in grain and meal, they shall be proved to be the best; or otherwise, to discard them for more valuable varieties.

This was the chief consideration which led me to make comparative experiments, in order to obtain the best seed.

Hence, as a first step towards improvement, Professor La Gasca, having shewn me four ears of those he considered the most productive, I sorted as many as I could collect, of precisely the same varieties, judging by their external appearance.

Such was my anxiety to attempt to raise a pure crop, that, in the month of November, 1832, I rubbed the corn from each ear, of all the four sorts I had selected, throwing aside the damaged or ill-looking grains, and reserving only, the plump and healthy.

The first selection was apparently one wholly of a Dantzic sort—white and smooth-eared. In the process of rubbing out the corn, I was much surprised to find that, though most of the grains were white, they differed greatly as to form; some being round, some oval and peaked, some plump but very small,

some more elongated, some with the skin or bran much thicker than others. There were also many with liver-coloured, yellow, and dark grains, among the white.

The second sort was from a square, compact variety of wheat, the grains being very plump, round, of a coffee-like form, very thin-skinned and white. There was a pale red inferior variety among it, much thicker-skinned, but without any perceptible external appearance in the ear.

The third, was a downy or hoary variety, one of the "Veloutés" of the French, and "*Triticum Koëleri*" of Professor La Gasca; a velvety or hoary sort, which is supposed to be very permanent in its duration, as relates to keeping pure. I found moreover, that there were a few red grains, some yellow, and some liver-coloured sorts amongst this, in small proportions it is true, but being of prolific habits, subsequent experience has taught, that they would soon have destroyed the purity of the crop, if cultivated without constant attention.

The fourth selection was from a variety of red ear with yellow grains, more peaked than the "Golden Drop;" these were all plump and well grown, but though of productive habits, afford less flour and more bran than the white varieties. I discovered a red variety among it, bearing white grains, which I suspect to be very prolific and hardy. I gave a

sample of it to the Right Honorable Sir John Sinclair, who greatly encouraged me to prosecute my researches, as being of the highest importance. There were also red ears, bearing liver-coloured grains, but these were chiefly lean and ill-grown.

I generally, but not invariably found, that the grain of white corn was the plumpest, or possessing the greatest specific gravity, or largest quantity of meal, a subject to which I shall devote a short chapter.

The aspect of the grain in that dry season, led me to suspect, that white sorts of wheat will succeed best on dry soils and in warm climates, and that red and yellow, or the darker coloured, prefer wet seasons or moist soils.

The care I took in making these selections, and the great number of sorts I found, of all shades and colours, forming varieties and sub-varieties, as they are named by Professor La Gasca, confirmed my conviction, that the only chance of having pure sorts, was to raise them from single grains, or single ears.

It is but fair to add, that even the pains I took in making those first selections, amply rewarded my labours, as the produce of my crops was increased from an average of about twenty-three or twenty-five bushels an acre, to about thirty-four, and since I have raised wheat from single ears or carefully selected sorts, I have increased my crops to between forty and fifty bushels the acre. Hence, I have no doubt, that with

extreme care, in obtaining the best and most suitable sorts of wheat, that land in high tilth, with fine cultivation, may be made to produce sixty or seventy bushels the acre.

Columella, while recommending much attention to be paid in choosing seed, says: "I have this further direction to give, that, when the corns are cut down, and brought into the threshing floor, we should even then think of making provision of seed for the future seed-time; for this is what Celsus says—"where the corn and crop is but small, we must pick out the best ears of corn, and of them lay up our seed separately by itself."

"On the other hand, when we shall have a more plentiful harvest than ordinary, and a larger grain, whatever part of it we thresh out, must be cleansed with the sieve; and that part of it, which, because of its bulk and weight, subsides, and falls to the bottom of the sieve, must always be reserved for seed; for this is of very great advantage, because unless such care be taken, corns degenerate, though more quickly indeed in moist places, yet they do so also in such as are dry. Nor is there yet any doubt, but that from a strong seed, there may be produced that which is not strong; but that which at first grew up small, it is manifest can never receive strength, and grow large; therefore Virgil, as of other things, so of this

particular concerning seeds, has reasoned excellently, and expressed himself in this manner :—

“ I’ve seen the largest seeds, tho’ view’d with care,
“ Degenerate, unless th’industrious hand,
“ Did yearly cull the largest.” Thus all things,
“ By fatal doom, grow worse, and, by degrees,
“ Decay, forc’d back into their primevous state.”

Thus, we perceive, the Romans, at the period of the Christian era, were urged to be careful in the selection of their seed wheat:

CHAPTER IV.

A FIRST COMPARATIVE EXPERIMENT.

PERCEIVING that there were so many varieties of wheat of similar external appearance, as even to baffle the experienced eye of Professor La Gasca, who once more obligingly pointed out, several varieties of different colours, which he suspected to be the most productive; I proceeded to put into practice what had occurred to me, to be the only secure mode, to ensure the growth of pure sorts of wheat; namely, to grow them from single grains, or from single ears, and to follow up the plan, by afterwards sowing only the produce of the most productive, so as to form a stock.

Hence at the same time, that I grew the sorts selected by the eye, in a field, drilled near other corn, in order to secure them from the birds, thus greatly to improve the purity of my general crops, I adopted the following method to grow the most pure, and farinaceous wheats.

The number of grains in the ears, of fourteen sorts, were carefully counted; in the smallest ear, there were twenty-three grains, in the largest seventy-four. The soil intended for their reception was a fine rich

loam, several feet in depth over red clay ; a bushel of ashes of sea-weed was spread over the surface, which was dug about the same depth that the plough was intended to turn the furrow, for a wheat crop. The seed having been soaked in strong brine, in separate glasses, was then dried with slacked lime, the drills were made nine inches apart, and the grains were dropped in singly, at about three inches depth, at distances from each other of from three inches, to eleven ; the whole being in a square of twenty-two feet, or a perch (Jersey).

By referring to the Table at page 19, it should be noticed, that the rows Nos. 15 and 16, which were sown very thick, and rows 17, 18 and 19, which were sown moderately thick, about as much so, as by a drill machine, at the rate of two or three bushels to the acre, appeared above ground on the 24th of December, or in seventeen days ; whereas, all the single grains, of every sort, came up *two days later*. A curious, but satisfactory proof, which experiments repeated since, for the purpose have confirmed, that the grains of wheat, when sown thickly, impart a certain degree of warmth to each other, and to the soil, which hastens their growth two or three days earlier than a single grain.

Owing either to the cold, worms, or birds, (though care was taken to watch the corn,) or unknown causes, several of the single grains never came up, as will be

REMARKS on an experiment made on fourteen varieties of Wheat, sown on the 7th December, 1832. Each row contained the grains of a single ear of corn; they had been soaked in brine for an hour, then dried as usual with lime. 27=1 denotes that 27 grains are equal to 1 scruple, apothecaries weight, &c.

NOS.	VARIETY AND DESCRIPTION.	Seeds sown.	Sample.	Up.	Died.	Ripe.	No. of ears.	Average of Tillers	Grains in best ear.	Height.		Weight of corn			Weight of straw.		REMARKS.
										feet.	inch.	lbs.	oz.	grs.	lbs.	oz.	
1	Triticum (Dantzic) Hybridum Candidum.....	64	27=1	Dec 26	3	Aug. 5.	625	10	70	4	8	3	3	2	3	9	White straw, fine.
2	Trit. Hyb. Album Densum.—Round White.	62	28=1	do.	7	do.	562	10	81	4	8	2	12	4	3	4	Stout straw.
3	Trit. Hyb. Album Densum.—Rubellum (reddish.)	53	27=1	do.	2	do.	556	10	86	4	5	2	12	7	3	6	Do. Do.
4	Trit. Hyb. (No. 6. c.)—Fine White.....	50	24=1	do.	4	do.	662	14	72	4	5	3	1	11	3	6	Straw very strong and thick.
5	Trit. Hyb. Coturianum.—Seedling—Fine White....	24	20=1	do.	0	do.	399	16	72	4	4	1	14	7½	2	4	Slight straw.
6	Trit. Koeleri, No. 1.—White Downy.....	44	22=1	do.	4	6th	627	15	58	4	7	3	3	2	3	12	Do. Do.
7	Trit. Koeleri Coturianum.—Seedling Red Downy.	24	18=1	do.	1	do.	350	15	55	4	4	1	9	6	2	2	Coarse Do.
8	Trit. Koeleri.—White Downy.....	65	23=1	do.	9	do.	649	11	68	4	0	4	4	0	3	13	Fine Do.
9	Trit. Hyb.—Red Compact.—Plump Whitish.....	40	23=1	do.	5	8th	355	10	57	4	6	2	9	0	3	15	Coarse Do.
10	Trit. Hyb.—Red ear.—Whitish.....	74	27=1	do.	7	6th	508	7	74	4	4	3	8	0	1	9	Reddish Do.
11	Trit. Hyb.—White ear.—Reddish Yellow Grain...	60	21=1	do.	3	2nd	461	8	62	4	9	2	4	6	2	9	Do. Do.
12	Trit. Hyb.—Yellow.....	74	25=1	do.	11	1st	578	9	78	5	6	2	10	3	3	12	Straw white and stout.
13	Trit. Hyb.—Grand Rubellum.—Liver Colored.	58	24=1	do.	14	5th	380	8	59	4	8	2	7	7	2	7	Coarse.
14	Trit. Hyb.—Reddish Yellow Grain.....	62	24=1	do.	4	do.	363	6	64	4	11	1	10	0	2	5	Fine white straw.
15	Sown thick from a	thk.		24th	„	do.	„	„	„	„	„	3	6	5	6	10	Do. Do.
16	Pint of Seed similar	do.		do.	„	do.	„	„	„	5	6	3	0	6	5	11½	Do. Do.
17	to No. 1, selected by	do.		do.	„	do.	„	„	„	„	„	2	0	6	3	13	Do. Do.
18	Professor La Gasca.	do.		do.	„	do.	„	„	„	„	„	2	11	2	4	12½	Do. Do.
19	White Dantzic.	do.		do.	„	do.	„	„	„	„	„	3	3	0	6	10	Do. Do.

[Faint, illegible text visible through the paper, likely bleed-through from the reverse side. The text appears to be organized in columns or paragraphs.]

RETURN of Produce in weight of Corn, taking an average from No. 7, which had just twenty-three grains sown, shewing the relative weight of produce, as well as the total weight of the 14 sorts.

NOS.	Grain grown.	Average.	Produced			Relative number.	Surplus.	Total.	Total Weight of Corn.		
			lbs	oz.	gros				lbs.	oz.	gros.
1	61	$\frac{23}{38}$	1 1	5 14	0 2	256	+	366 = 625	3	3	2
2	55	$\frac{23}{32}$	1 1	4 8	4 0	253	+	309 = 562	2	12	4
3	51	$\frac{22}{28}$	1 1	5 7	5 2	272	+	284 = 556	2	12	7
4	46	$\frac{23}{23}$	1 1	9 8	11 0	350	+	312 = 662	3	1	11
5	23	$\frac{23}{23}$	1	14	$7\frac{1}{2}$	387	—	= 387	1	14	$7\frac{1}{2}$
6	40	$\frac{23}{17}$	1 1	14 5	2 0	384	+	243 = 627	3	3	2
7	23	$\frac{23}{23}$	1	9	6	350	—	= 350	1	9	6
8	56	$\frac{23}{33}$	1 2	13 7	0 0	262	+	387 = 649	4	4	0
9	35	$\frac{23}{12}$	1 0	15 10	0 0	226	+	129 = 355	2	9	0
10	67	$\frac{23}{44}$	0 2	15 9	0 0	182	+	326 = 508	3	8	0
11	57	$\frac{23}{34}$	0 1	14 8	0 6	212	+	249 = 461	2	4	6
12	63	$\frac{23}{40}$	1 1	0 10	3 0	256	+	352 = 578	2	10	3
13	44	$\frac{23}{21}$	1 0	8 15	4 3	193	+	187 = 380	2	7	7
14	59	$\frac{23}{36}$	0 0	10 15	7 1	147	×	216 = 363	1	10	0
680 Grains produced a Total Weight of lbs. from a little more than one and a quarter of Corn.									38	0	$7\frac{1}{2}$

Result of an Experiment to ascertain the quantity of Meal, or Flour and Bran in each of the fourteen varieties under trial.

Nos.	DESCRIPTION OF GRAIN.	$\frac{1}{2}$ Gill Measure Weighed.			Produced in Flour.			Produced in Bran.			Total in Grinding.			Loss in Grinding.		
		oz.	gros.	grs.	oz.	gros.	grs.	oz.	gros.	grs.	oz.	gros.	grs.	oz.	gros.	grs.
1	White Dantzic—large round.....	1	5	28	1	0	42	0	4	24	1	5	2	0	0	26
2	Small round.....	1	4	50	0	7	50	0	4	34	1	4	24	0	0	30
3	Reddish Round.....	1	4	37	0	7	5	0	5	14	1	4	19	0	0	18
4	Fine White—longish.....	1	4	46	0	6	3	0	6	37	1	4	50	0	0	16
5	Fine White Seedling—roundish.....	1	4	39	0	6	3	0	6	20	1	4	32	0	0	7
6	Fine White.....	1	4	52	0	7	18	0	5	11	1	4	29	0	0	13
7	Coarse Yellow—round.....	1	4	50	0	6	51	0	5	41	1	4	28	0	0	22
8	Fine White.....	1	5	4	0	7	24	0	5	12	1	4	36	0	0	32
9	Plump Whitish—roundish.....	1	4	38	0	6	46	0	5	32	1	4	14	0	0	24
10	Whitish.....	1	4	39	0	7	20	0	5	4	1	4	24	0	0	15
11	Reddish Yellow.....	1	4	44	0	6	57	0	5	39	1	4	32	0	0	12
12	Yellow—round.....	1	4	44	0	6	8	0	6	26	1	4	34	0	0	10
13	Liver—elongated.....	1	4	32	0	6	34	0	5	44	1	4	14	0	0	18
14	Reddish Yellow—plump.....	1	4	28	0	6	28	0	5	29	1	3	57	0	0	31

seen by the column, How many failed. No. 13, called "Grand Rubellum," by the Professor, or the red Lammas wheat, I believe, out of 58 grains lost 14; whereas No. 5, the Coturianum, lost none. No. 1, a variety suspected to be delicate, but one of the best wheats, both for produce and meal, from 64 grains, only lost 3. In this manner I was led to judge of the hardiness of the varieties, and I was well pleased to observe that the white, or most valuable sorts, were full as hardy as the red.

It appeared that out of seven hundred and fifty-four grains, the whole number sown singly, seventy-four never came up; a loss of nearly one tenth, even with the care and attention I bestowed on them.

I have further discovered, that some sorts are still more delicate, of very precarious and uncertain habits.

The habit of growth of many varieties, differs very considerably; some being of a close upright growth, others spreading and trailing along the ground; some tillering sooner than others: those in the experiment had all done so by the middle of March. On the 27th, they were hoed for the second and last time, and were afterwards perfectly free from weeds.

I was not, at that early period of my research, so attentive to the moment of flowering as I have since been; as the knowledge of that precise moment might prove of the greatest importance to an intelligent farmer, there being an interval of a week, or

ten days, in the period of flowering of some of the sorts. Hence, a judicious selection, with due care as to the time of sowing the variety, that will soonest come into flower, would enable him, not only to keep his crops from intercrossing by the intermixture of their farina, but as they would ripen in succession, enable him also to bring in his crops in rotation, as each variety ripens, without being hurried by his whole crop being fit for harvesting at the same moment, which is now too often the case.

It may be noticed that a single grain, picked up on the high road by chance, which I immediately perceived to be of an entirely different form, and of a larger size, than any I had yet seen, though sown a week later than the others, was the first to ripen, and was cut on the 31st of July. It has still preserved its early habit, which I know, having now a small field of it.

No. 9, the latest, was only ripe on the 8th of August. This difference in the period of flowering and ripening, could further be increased by arrangement, as to exposition and soil.

The next and chief object of attention, was their comparative produce in grain.

No. 1, produced 3lbs. 3oz. from 61 grains, and 3lbs. 9oz. weight of straw, of a beautiful white colour: whereas No. 14, a red variety, only produced from 59 grains, 1 lb. 10 oz. of wheat, and 2lb, 5 oz. of

straw. Here then was an immense advantage in favour of No. 1, which produced nearly double the quantity of wheat, and a third more straw—its average of tillers being ten, whereas that of the inferior sort was only six ; and Professor La Gasca, it must be recollected, imagined that this last, was one of the most productive varieties, evincing the positive necessity of comparative experiments, to ascertain the relative produce of wheat, which the theory alone, even of the learned Professor himself, could never have discovered ; he merely having judged, from the external appearance of the wheat, its squareness, and compact form ; than which, nothing could have proved more deceptive.

No. 8, a downy variety, was still more productive than No. 1, as fifty-five grains produced 4lbs. 4oz. of wheat, and 3lbs. 13oz. of straw, its average of tillers being 11 : the straw of a fine colour, and the sample very beautiful, though scarcely so fine, or thin-skinned as No. 1. This produced nearly three times as much corn as No. 14, and a third more straw.

These comparisons decided me to attempt the future cultivation of those, I had discovered to be the most productive, by a comparison of the produce of a whole ear. From a further examination, as to the relative produce of 23 grains, of every sort, taking Nos. 5 and 7, which had but that number of grains in an ear, and by thus drawing two scales of comparison, I hoped that a satisfactory conclusion might be

arrived at. Hence, the minimum, scale or number, was fixed on to compare their relative produce, from an equal number of grains. Thus, No. 7, containing twenty-three, the least number of grains in one ear, became the standard, to compare the relative produce of the whole fourteen sorts.

By following up these comparisons, it was suspected that Nos. 5, 7, 3 and 1, were among the hardiest varieties; but here their merits in some degree cease; No. 8 being the most productive, and Nos. 1 and 6 being equal. No. 8 is also the second most productive in straw, the fourth in the average number of tillers, also the second in weight of grain, and the third in produce of flour. It was therefore believed to unite many good properties, and has proved to be a highly productive, and valuable variety, of a downy or hoary sort, with a roundish white grain, rather thin-skinned, producing very fine flour, which makes delicious white bread. It has produced fifty-one bushels to the acre. No. 1, being an ear of a fine variety of wheat from Dantzic, has also proved to be highly valuable, though the straw is so tall, that it might be apt to lay, in moist situations.

I was induced also to cultivate No. 5, being a seedling variety, not at all disposed to sport or change, producing a very fine round white sample: it has proved very productive. It produced from 23 grains more than any, but then it had the advantage of double

distance between the grains, which doubtless tended to its increase. Its average of tillers was 16.

By an examination of the comparative list, at page 21, it will be perceived, that it was easy, to arrive at some sort of general conclusion, by attention to the produce of ears that contained nearly the same number of grains, and again, by a second investigation, as to their relative produce throughout the whole, to establish, which were those most advisable for general crops.

The continued investigations of two subsequent years, have further confirmed me in my original opinions. I am now convinced that a proper selection of wheat is indispensable, my crops having almost doubled in produce ; since I have raised seed of a pure sort. Those intelligent and superior farmers, who have already made great strides towards pure crops, by a careful selection of seed, must not expect so great an increase. To those, however, I hold out decided hopes of improvement, by the means I recommend.

It must appear obvious, from the tables I exhibit, that a farmer who would sow No. 14 on a soil which would equally suit No. 8, might be unable to pay his rent ; whereas, had he happened to have sown No. 8, he would have had nearly three times more wheat, and a third more straw ; hence, it must be clearly seen, that in any intermixture of sorts in

crops, some, as I have already stated, having no less than twenty-three varieties :—the loss of produce, as compared with entirely pure crops, suited to the soil and climate, would be in exact proportion to the number of less productive sorts so intermixed.

CHAPTER V.

ON THE ROOTS AND GROWTH OF WHEAT.

It has been stated that wheat, when sown in November or December, appears in seventeen or nineteen days. An excellent article in the Georgical Essays, led me to repeat a course of experiments made by the author, who speaks of them in the following manner : —“ It is not sufficient for a farmer to be acquainted
“ with the nature of different soils, he should be acquainted with the nature of such plants as are used
“ in field husbandry. The soil and roots are so intimately connected, that the knowledge of both becomes essential. Wheat has two sets of roots :
“ the first comes immediately from the grain, the other shoots from the crown some time after.
“ I shall distinguish them by *Seminal* and *Coronal* roots.

“ Plants, according to their species, observe a regular uniformity in the manner of spreading their roots ; for which reason, the same grain cannot be continued long upon the same soil. Is it not that each takes from the earth such parts as are congenial? The food of all plants is the same ; only some require more, some less ; some take it near the

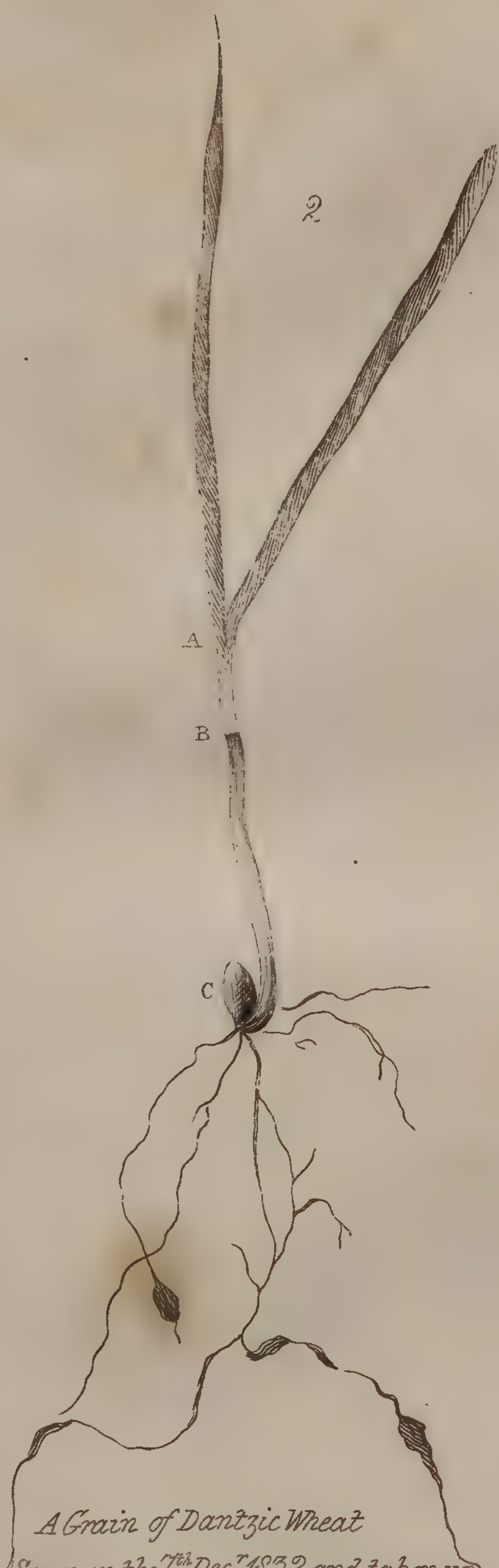
“ surface, others seek it deeper. This opens to our
 “ view a noble field of instruction. A careful in-
 “ spection of a healthy root, will at once demonstrate
 “ the bias of nature. An examination of the soil will
 “ show how far that, and the roots will coincide.

“ This is the rational basis of the change of spe-
 “ cies so well understood in Norfolk, where tap-
 “ rooted plants always follow those that root su-
 “ perficially.

“ Wheat being subject to the severity of winter,
 “ its roots are wonderfully disposed, to withstand the
 “ inclemency of the season. A view of their shape
 “ will direct us in the manner of sowing that grain to
 “ the most advantage ; and at the same time enable
 “ us to account for some of the phenomena observa-
 “ ble in the growth of it. I have observed that wheat
 “ has a double root. The first, or *seminal* root, is
 “ pushed out at the same time with the germ, which,
 “ together with the farina, nourishes the plant, until
 “ it has formed its crown.”

As I think I have followed the same course of ex-
 periments with even more care than the author of
 the above extract, I shall state my own observations
 in corroboration of it.

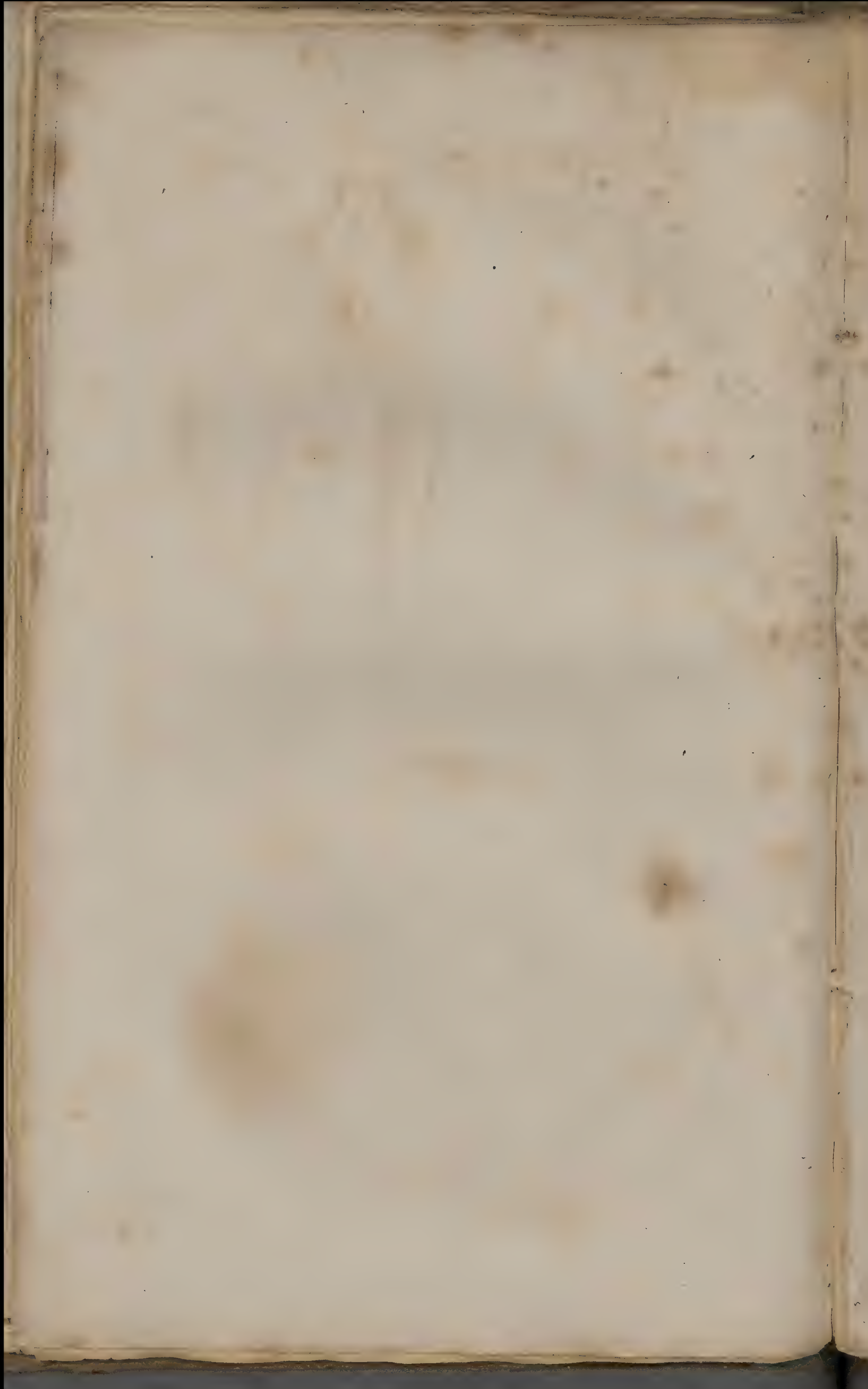
FIG. 1.—Appearance of a grain of wheat which
 had been sown three inches deep, on the 12th Janu-
 ary, after sixteen days growth, with its germ and
 seminal root.

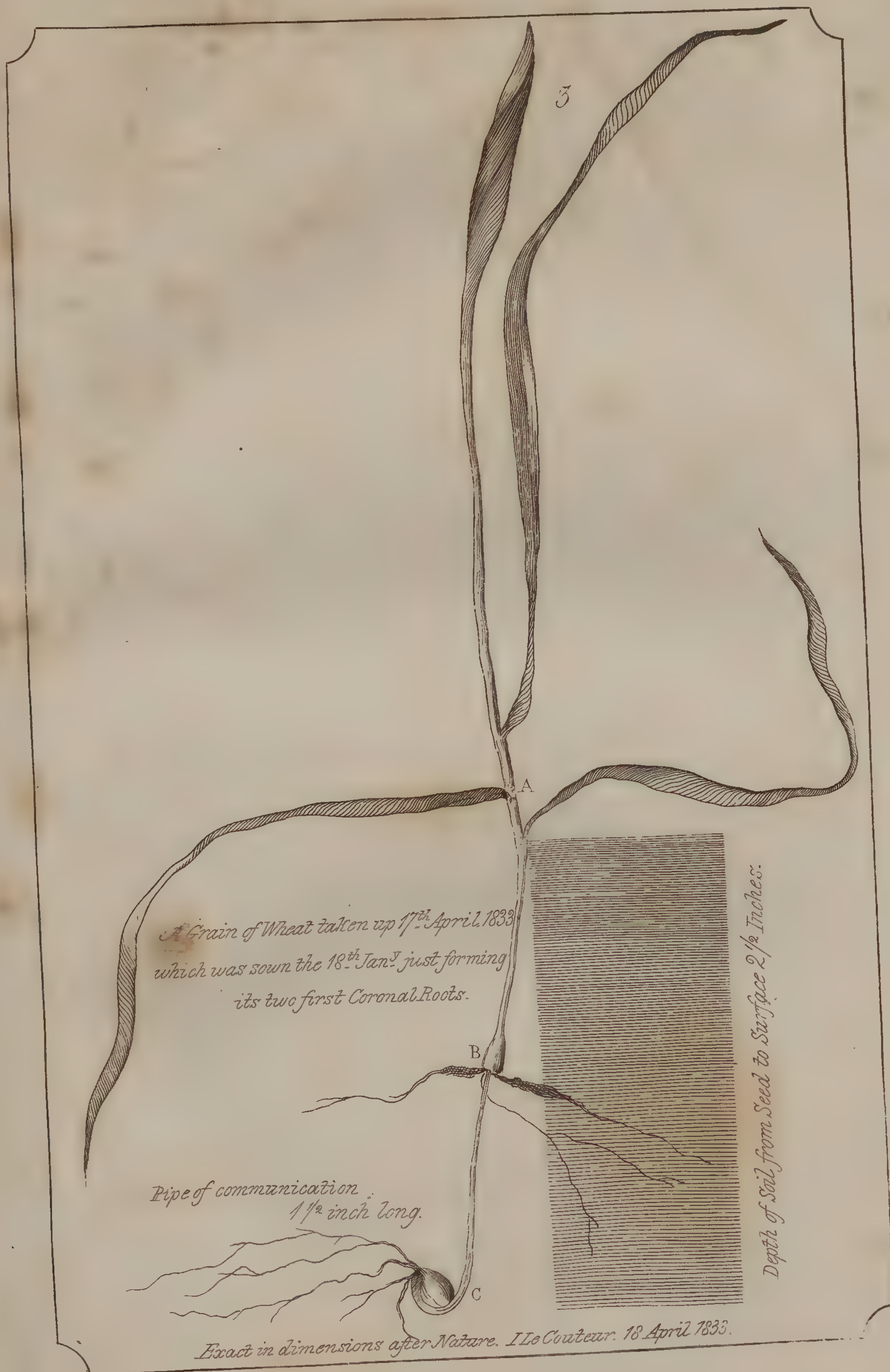


*A Grain of Dantzic Wheat
Sown on the 7th Dec^r 1832 and taken up
on the 1st Feb^y following. had not yet
formed its Coronal Roots.*



*A Grain of Wheat
Sown on the 12 Jan^r 1834.
was in this State the 27 Jan^r following.
16 Days sown.*





Exact in dimensions after Nature. J Le Coureur. 18 April 1833.

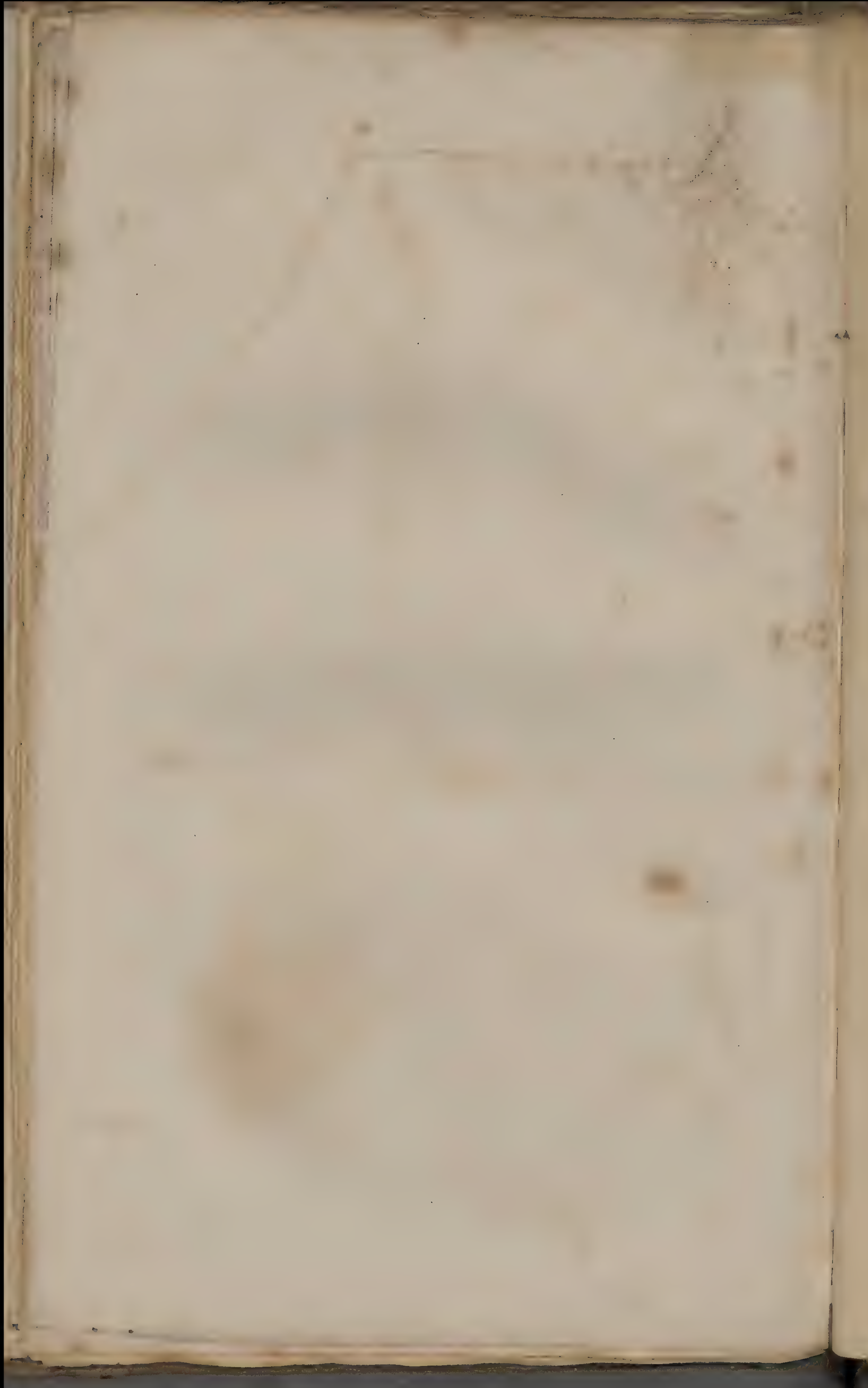


FIG. 2.—Appearance of a grain of wheat after fifty-two days growth, the coronal roots not yet having pushed; *a.* the origin of the crown from which the plant tillers; *b.* the pipe of communication, covered with a membranous sheath; *c.* the grain with its seminal roots.

FIG. 3.—A grain of wheat after sixty days growth, just forming its upper set, or coronal roots. This was sown about 3 inches deep, thus the plants having been drawn from nature, and being exact in dimensions, show its process. *a.* the crown of the plant beginning to tiller; *b.* two coronal roots, an inch below the surface; *c.* pipe of communication to the seed, one inch and a half long.

“In the Spring, when the crown has become sufficiently large, it detaches a number of strong fibres, which push themselves obliquely downwards. These are the *coronal* roots. A small pipe preserves the communication between them and the *seminal* roots. It makes an essential part of the plant, and is observed to be longer or shorter, according to the depth that the seed has been buried. It is remarkable, however, that the crown is always formed just within the surface. Its place is the same, whether the grain has been sown deep or superficial. I believe I do not err, when I call this *vegetable instinct*.

“ As the increase and fructification of the plant
 “ depends upon the vigorous absorbtion of the coronal
 “ roots, it is no wonder, that they should fix them-
 “ selves so near the surface, where the soil is always
 “ the richest.

“ From an attention to this circumstance, we are
 “ led to explain the operation of *top dressings*. In
 “ the northern counties, wheat is generally sown late.
 “ When the frost comes, the *coronal* roots, being
 “ young, are frequently chilled. This inconvenience
 “ may, however, be easily prevented, by sowing more
 “ early, and burying the seed deeper. The *seminal*
 “ roots being out of the reach of the frost, will then
 “ be enabled to send up nourishment to the crown,
 “ by means of the pipe of communication.”

FIG. 4.—Shows a plant of wheat sown superficial.
a. the crown and roots; *b.* the pipe of communica-
 tion; *c.* the *seminal* roots, and capsule of the grain.

“ Hence, it is obvious, that wheat sown superfi-
 “ cially, must be exposed to the severity of the frost,
 “ from the shortness of the pipe of communication.

“ The plant in that situation, has no benefit from
 “ its double root. On the contrary, when the grain
 “ has been properly covered, the *seminal* and *coronal*
 “ roots are kept at a reasonable distance. The crown,
 “ being well nourished during the winter, sends up
 “ numerous stalks in the spring. On the tillering

“ of the corn, the goodness of the crop *principally*
 “ *depends.*

“ A field of wheat, dibbled, or sown in equi-distant
 “ rows by the drill plough, always makes a better
 “ appearance than one sown with the harrow. In
 “ the one, the pipe of communication is regularly of
 “ the same length, but in the other, it is irregular ;
 “ being either too long or too short.”

The elegant writer, whom I have thus largely quoted, says truly, that a noble field of instruction is here opened to our view ; the double set of roots, thrown out by wheat, shewing clearly that the first set, formed from the seed itself, and shooting downwards, seek their nourishment and freshness from below, while the upper set, or coronal roots, receive theirs from the richer particles of the manure, which rise near the surface of the soil, also from top dressings, and from the influences of the atmosphere.

This theory appeared so plausible and consonant to common sense, that the Author, a few years back, was induced to plough in some fine seed of Dantzic wheat, about seven or eight inches deep.

It had been soaked, pickled and limed, and was in a rather pulpy, soft state ; the consequence was, that being buried *too deep*, and the winter and spring proving cold and wet, a vast quantity of the seed rotted instead of germinating, and proved a very losing crop, much to his regret and mortification. It is of

the utmost importance to avoid running into extremes in the prosecution of any new experiment, how plausible soever it may appear. Had the seed been sown at four inches depth, it probably would have all germinated, or even had it been less soaked, and pickled a less time. But the intention was to have the seminal roots at as great a distance from the coronal roots, as possible, in order that their nourishment should be drawn from opposite sources.

The medium distance has ever since been followed from three to four inches, which appears to answer perfectly in this climate.

It may be well to notice, that nature has in some measure pointed out that wheat may be sown quite superficial, as self-sown wheat is frequently seen very rich, and fine, under which circumstances it may not have been buried, a quarter of an inch, even supposing the wind, and rain, to have favored its deposition.

Hence, it may be argued, that wheat does not require to be sown very deep, but that a medium depth, sufficient to protect it from frost, so as also to enable its distinct set of roots to seek their food in different channels, is the safest practice ; the exact depth being a question of local experience, in relation with the nature of the soil and climate.

The extraordinary and valuable propensity of some varieties of wheat, to tiller, which others, will by no means do so much, is connected with this chapter.

One plant, from a single grain, of a downy variety, in 1833, threw out 32 tillers; all produced ears, with an average of 50 grains to each, or 1600 grains from one; an enormous produce, which no field cultivation could be fairly expected to attain, as it is not the extraordinary quantities, which art may produce, either by extreme care, subdivision, and transplantation, that should be brought under the consideration of farmers; but the fair and legitimate mode of husbandry, attainable to all who will devote to its pursuit, that industry and enquiry, without which, their art is a mere mechanical operation, throwing in a little seed, and leaving nature to do the rest. The average tillering on that productive variety I have alluded to, was *fifteen* on forty plants, clearly evincing a prolific habit which has since been established. To ascertain this prolific habit, was one of the great objects I had in view.

CHAPTER VI.

ON THE NECESSITY OF PRESERVING CROPS PURE.

SOME corn factors have declared that it will be impossible to grow wheat in this country, of such fineness, whiteness, and beauty, as is raised in the Polish provinces of Vollhynia, and Sandomir; unquestionably, if success should attend the British husbandmen in discovering a variety, as plump, white and thin-skinned, as the celebrated white sort, a small portion of which, forms the precious part of that which is imported under the name of "high mixed," it might prove an interference with their line of business; as the English baker would then look to the English farmer, for the most valuable meal he requires.

In almost every branch of Horticulture, or Floriculture, science, to meet the calls of luxury, has succeeded in triumphing over the impediments opposed to it by climate and distance. The pine, the peach, and melon, are grown in equal, nay some assert, in greater perfection in England, than the indigenous fruit; and the dahlia, geranium, and lily tribes, are more varied than in their native soils, and by seedlings are naturalised to ours.

These fruits and flowers are all classed, and named ; so are apples, pears, gooseberries, and a multitude of other fruits. The "Coccagee," or "Siberian bitter sweet," may be recommended as the best for cider, and no good ciderist would think of mixing every apple of every colour, ripe and unripe, for his mill, but makes his selections from pure sorts, whose properties and qualities are known. Strange that the same attention to selection and purity, has been overlooked in that product which is the chief sustenance and comfort of the human race.

It only remains to discover those wheats, which will grow in this climate, without becoming flinty, or thick-skinned ; and if they cannot be obtained of varieties from abroad, they may be got from seedlings at home.

The Gracious Author of all things, may have bounteously spread and multiplied this precious plant, for the very purpose of leading men to seek out, and discover those sorts, which are adapted for their respective climates ; and patient research only, may be required to ensure success. May not some intelligent husbandman in Volhynia, perhaps only a shrewd practical farmer, have discovered one sort, which exactly suits its climate, as also the market it is intended for ; and without having written a treatise on the subject, may he not have distributed it as a precious boon to his countrymen ? Is any corn factor prepared to say,

that all the wheat grown in Volhynia, and Sandomir, is plump and perfect? That no varieties are grown there, which may appear coarse, lean, or shrivelled? Not having been there, I am unable to speak from personal experience; but evidence, as far as examination goes, and hearsay, lead one to believe that there, as well as elsewhere, seasons affect wheat, and deteriorate it, both in its appearance and intrinsic value.

Hence, it is confidently assumed, that it only remains to be ascertained which are the best British wheats, in order to secure them of British growth from the climates of England, Ireland and Scotland, as pure, plump, and thin-skinned, as the choicest "high mixed."

I have shewn the great productiveness of some sorts. I have often found, among some of the Dantzic white wheat, a coarse red thick-skinned sort, which in the ear was precisely similar in appearance to the proper one to be cultivated; even so similar, as to be undistinguishable from it, when viewed by Professor La Gasca and myself, through a magnifying glass; it was only on examining the grain, that the inferiority of one of the two was perceivable: therefore, where seed is not originally procured pure, it should be selected, and all the grains of a different shade from the approved sort, removed; or the mixture and deterioration of a crop might be such, as to

lead a farmer to wonder, how it could thus have *degenerated*, as it is termed, in the short space of a season or two, in defiance of the expense he may have incurred, or of his care and diligence.

Two years ago, a farmer requested me to view a very *pure crop*, there was no mixture in it ! In merely walking round the crop, which, in fact, was both pure and fine, in common parlance ; I selected from it ten varieties ; had I gone into it, ten more would probably have been found. - A crop of this variety, the Duck's Bill, then originally procured from Kiel, in the Baltic, which I saw this year as a second year's produce, is so intermixed, as almost to make it difficult to pronounce what variety it is intended for.

The Duck's Bill to which I allude, is very subject to shake out from the ear, if at all over ripe ; and has proved to be only fit for making pastry, as it is too tenacious for the purpose of making household bread : hence the necessity of not only having wheat crops pure, but of knowing their particular qualities and properties.

CHAPTER VII.

ON MEAL AND BREAD.

THE main object of farmers has been, merely to grow the largest possible crop of wheat, whereas the true aim of corn growers should be, to produce the largest quantity of meal or flour. It is to the real nutriment we should look—to those transparent, thin-skinned wheats, which are enveloped in so fine a husk or coat, or in so little bran, and contain so much meal, that when compared with the coarse red wheats, one is almost surprised the plants should bear the same name; some of these last having a large portion of thick, coarse bran, with dark, coarse-looking flour, affording much less bread than the former varieties, and that of an inferior quality.

Some of these coarser descriptions of flour, are prepared for sale by being mixed with potato flour, or other compounds, to make up that adulterated bread which is often met with in cities. I have known bread, made from a judicious admixture of winter and spring wheats, to preserve a wholesome moisture, and to continue of good flavour for eight or ten days, whereas most London bread thus kept, would have

become so dry as to be scarcely eatable, perhaps even mouldy.

The difference of the nature and property of meal produced from various wheats, is such, that it should be clearly made known, and established, in order to enable millers to name the portion of dry light flour, or the portion of flour of a moist nature, required; or that the combination of two, or more sorts, would exactly suit their purpose.

The growers should supply the millers with wheat of known qualities, and the millers form the mixtures as the bakers might desire.

It will be recollected, that in order to ascertain the relative specific gravity of each variety of corn, the number of grains were noted that exactly weighed a scruple; page 19. Such was their difference, that it only required fourteen grains of one sort, of my own growth, to weigh a scruple, whereas it took forty-two of a sample from the Baltic, which, probably, must have been kiln-dried, as not one grain sprouted. It is assumed that this may be a good mode of ascertaining which contains most meal, as it appears to be consonant to reason, that the heaviest grains should generally contain the greatest portion of farina, though I am yet unprepared to say positively that the latter must be the finest, or whitest.

This attempt to ascertain the comparative weight of many varieties, by merely weighing them, led me

to prosecute my researches from the straw, and grain, on to the meal itself, in order to be fully satisfied which of the fourteen sorts under experiment, contained the greatest portion of meal or flour.

Hence, I hoped to ascertain, if the most productive sort in grain, should also prove the most farinaceous ; a great, and important desideratum. I am truly happy to say that such was almost the result. I shall indicate how much further it requires to be prosecuted, to establish it.

The mode I adopted, was to strike a measure full of each sort of wheat, which was then ground by myself, in a small mill. The scale of weights used, was sixty-four grains apothecaries weight, equal to one gross, and eight gross, equal to one ounce, of sixteen to the pound.

It will be seen, by referring to the table, that a measure of No. 1, or Jersey Dantzic wheat, weighed one ounce, five gross, and twenty-eight grains ; this produced one ounce and forty-two grains of flour, with only four gross and twenty-four grains of bran : whereas, the most inferior variety, or that, which produced most bran and least meal, from the same measure, produced only six gross, three grains of flour, and six gross, thirty-seven grains of bran—in fact, more bran than flour. This, however, is not a conclusive experiment to determine the growth of wheat on an extensive scale, as no one, it is hoped, has yet

had the misfortune to grow a pure crop of a very bad unproductive sort. But, if such were the fact, the difference in the produce of meal, in addition to the excess in the produce of grain, of the superior over the inferior variety, would, if carried over the five millions of acres employed in the cultivation of corn in the United Kingdom, make the quantity absolutely enormous.

Any person may, by examining the tables, find out the difference of produce in any two of the sorts, or the superiority of any one good sort, over the other thirteen sorts, which, together, make up a mixture to be found in most fields; by which he may satisfy himself as to the positive advantage of establishing, which is the variety of wheat best suited to his own particular locality.

The experiments made as described above, have led to the following results, in the three following varieties of my own growth.

From a downy or hoary variety, eighteen pounds of flour, with half a pint of yeast, five quarts and a pint of water, and one ounce of salt, made *twenty-four* pounds of beautiful light, white bread.

From a Dantzic wheat flour, the same quantity, with the same proportion of yeast, salt, and water, made *twenty-four pounds and a half* of very white bread, similar to French bread.

The same weight of spring wheat flour, made *twenty-four* pounds of inferior, brownish bread.

The same weight of Rostock and Dantzic flour, from wheat grown in the Baltic, made only *twenty-three* pounds of bread, very light and good, but not so white by many shades, or well flavoured, as that made from the two first varieties of home-growth.

These experiments having been made in my own presence, may be relied on. The dough was worked in the French mode, not pushed down, turned and worked with closed hands, but drawn up into long strings and repeatedly lifted, in order to expose it to the action of the air as much as possible, which tends greatly to improve the bread, by rendering it more light and easy of digestion.

The superiority of the meal of the hoary variety of wheat, which furnished three pounds more bread on a baking of eighteen pounds of flour, or an increase of one sixth, over the Dantzic and Rostock, which was also a very fine sample of flour, is thus clearly established.

It is said at the article "Baking," in the 2nd volume of the Encyclopedia Britannica, "that a sack of flour, weighing 280lbs., and containing five bushels, is supposed capable of being baked into eighty loaves, in the Act of Parliament regulating the assize upon bread. According to this estimate, one-fifth of the loaf consists of water and salt, the remaining four-fifths of flour. But the fact is, that the number of quartern loaves that can be made from a sack of flour, depends entirely upon the goodness of that

article. Good flour requires more water than bad, and old flour than new. Sometimes, eighty-two, eighty-three, or even eighty-six loaves, may be made out of a sack ; sometimes, scarcely eighty."

Now, assuming these data to be correct, the results I have obtained, prove that the hoary wheat, No. 8, will afford flour that will make ninety-three quartern loaves from a sack, being a superiority of ten loaves on each sack, taking the medium number eighty-three ; and this, be it observed, without adulteration, the pure home-made bread, unmixed with alum to whiten it, or potato meal to moisten it.

This superiority, be it further observed, is over a good quality of flour, not over that of some spring wheat, or inferior red wheat, both of which I shall indicate hereafter.

CHAPTER VIII.

ON MANURE FOR WHEAT.

THE effect of different manures on wheat, is very remarkable; it will not be necessary to say much on the subject, as it is almost exhausted, having been fully treated by far more able pens; but having made some experiments on the subject, I may be excused from publishing their results.

I confine my observations to those manures, which are within the reach of most farmers, with one or two exceptions.

Stable manure will, in ordinary good soils, have the effect of causing the plants to tiller much, or to make straw and grass; thereby diminishing the produce in grain and meal considerably.

Liquid manure, one-third stable drainings, and two-thirds water, which I caused to be poured once, over wheat that was just tillering, made the straw grow rank and coarse, the grain of every variety of wheat was dark and thick-skinned, hence, containing less meal. The same quantity and mixture of liquid manure, poured a second time over another portion of wheat, caused it to grow so rank and full of leaves,

rather than straw, that only a few of the plants produced ears of wheat, some having run up into sharp points, with merely the rudiments of ears indicated. The few ears that produced corn, displayed it in its worst form, hardly in the shape of meal, of a doughy soft texture, evidently unfit for the food of man; besides, some of them were smutty. Thus, an over application of manure, excellent, when judiciously applied, becomes a poison, precisely in the same manner, as in the human constitution, a surfeit is usually the parent of some disease.

The wheat on either side, of these experiments, which had only been manured with the ashes of Kelp, or Sea-weed, was healthy, productive, and farinaceous in the highest degree.

My attention, was particularly called to the proper application of manures by an old and experienced farmer, who considered Kelp or the ashes of Rock Sea-weed, that which is cut; the best of all.—I am convinced by subsequent experience, that two or three pounds worth of it, per acre, spread at the proper period, about two months before sowing time, would always more than repay itself.

It attracts moisture from the atmosphere; it materially increases the volume of the grain and fineness of the sample; but does not add to the weight of the straw, though rendering it whiter and more nourishing to cattle. It causes the wheat to assume a rich

healthy appearance, and is an excellent application, after a crop of potatoes or parsnips, both of which, require land to be richly dressed with stable or other strong manures, and has not the effect of decomposing them, as lime does.

It is also destructive to insects, and to their eggs, which lie in the soil or turf—it forces the earth-worms and wire-worms from their lurking places to come to the surface and die; particularly when laid on, in a larger quantity than I have named, some farmers being in the habit of putting on double, even treble the quantity above stated—but I believe, without having produced proportionably larger crops from inferior land; though it has been asserted that its effect is very permanent, being especially apparent on the succeeding clover crops.

I am inclined to believe, that paring and burning an old ley, will almost produce an equally good effect, where the land is suited for it—for, although the ashes may not be of that superior quality, or possessing all those virtues peculiar to Kelp ashes; still, the much greater portion of ashes, that can by this means be spread on the land, may make amends in quantity, for quality.

An additional circumstance in favour of paring and burning, is, that all the seeds of weeds, or the eggs of insects which lie concealed in the turf, are thereby destroyed, more effectually, than by any repeated ploughings.

The careful experience of five years on this head, has convinced me of the propriety of this practice occasionally; especially on ground infested with couch, or knot grass. From three acres of land that had been pared and burned, which produced five hundred and forty single horse loads of ashes, I obtained a very heavy crop of Turnips—the following year I raised ninety-one thousand pounds of Potatoes; and, by an application of about forty-five bushels of lime per acre, I have since reaped fifty-one imperial bushels of beautiful wheat per acre; the straw, also, was of very fine growth, five feet high, and exceedingly white and bright.

Kelp ashes should lay on the surface of the soil, a month or two previous to sowing time, in order to weaken their caustic power, or they are otherwise apt to burn the young and tender shoots of the corn, as well as the larvæ of insects; but, by laying a certain length of time on the surface exposed to the action of the atmosphere, or perhaps, what would be better practice, merely lightly turned into the soil, they become eminently beneficial.

I am so partial to the use of ashes, that I should recommend those who have large woods or forests, to employ women and children to collect the dry and broken boughs, and under shrubs, to be burned for the sake of the ashes; which would be found nearly equal to those of sea-weed, and could thus

be procured at a much cheaper rate ; besides gaining the advantage of converting what is now wasted, or neglected, into a most valuable and permanent manure, perfectly free from weeds, and destructive to insects and worms.

Ashes are further beneficial, inasmuch as they attract the moisture from fogs and dews, and retain it a considerable length of time.

Lime is so well understood as a manure for wheat, that it would be a mere waste of time to say more on the subject, than as far as my own experience goes ; it appears to impart a greater degree of whiteness to the Straw than any other manure. Its other excellent qualities of absorbing moisture from the Atmosphere in dry weather, on light or gravelly soils, and increasing the weight of the grain, are well understood ; it is to be lamented that some general rule for its application is not made known, as, in the best books I have consulted on the subject, it varies in the extraordinary proportion from fifty-six to five hundred bushels per acre, which last appears to me to be an absurd quantity.

I have found it to answer perfectly at the rate of Forty or Fifty bushels an Acre on a good loam, and I should apprehend that double that quantity ought to be sufficient for the poorest land ; unless it be to destroy moss, when a still larger top dressing is required, which, if well harrowed in, does it effectually.

This commixture of turf and lime, if soon after ploughed in, in turn becomes itself, a manure for the very soil the turf previously rendered barren.

Soot is said to be an excellent top dressing. I have tried it but once, without having perceived the advantageous results that are said to be derivable from it, it is only in the environs of towns, or villages, that it can be obtained in sufficient quantity to be available to a large farmer.

CHAPTER IX.

ON A CHANGE AND CHOICE OF SEED.

It is generally believed that an occasional, some say a frequent, change of seed is indispensable ; otherwise, the plant soon becoming familiarised to the soil, loathes it, as it were, and consequently diminishes in produce. I am strongly inclined to believe, that this is an erroneous idea ; partly owing, not only to negligence in the selection of seed, from the finest of a crop, but also to a want of attention in the arrangement of succession, which I have before spoken of.

It is perfectly true, that all plants become tired of one soil, and of one manure, they, like the human race, have their appetites and loathings, and a person that would be forced constantly to eat the same sort of food, would not only infallibly sicken of it, but most likely suffer in his health. So it is, with the cultivation of wheat, or any other plant. The best cultivator of Lucerne I have ever known, whose practice extended over forty years experience, assured me, that until he adopted the method of giving it fresh food yearly, he never made it produce as he had since done. One year, it was dressed with

decomposed manure ; the next, with ashes ; the third, with salt ; and the fourth, with lime.

I have applied this principle to wheat—that which is grown on land, manured from the mixon, one year ; becomes seed for land prepared with lime, that again becomes seed for land dressed with ashes, then for land dressed with mixed manures, and so on, varying the food as much as possible, hence giving a good variety every chance of finding a new soil, on each occasion. It may be objected that such a system could not be continued on a larger farm, where five or six hundred acres of wheat come into rotation : that may be true, to a certain extent ; but a little address, and judgment, even on such a scale, by judicious subordination, would enable a farmer to surmount the difficulty, as fifty acres kept in rotation, on such a farm, solely for seed corn, even at thirty bushels the acre, would be the required quantity. So on a small farm, where only fifty acres of wheat would be cultivated, five acres skilfully managed in the same way, might prevent the deterioration, or degenerating of a variety suited to the soil and climate. It is sometimes difficult to replace a good and suitable variety, though it may have degenerated as it is called.

Columella was so aware of the importance of procuring the choicest seed, that he observes, “ I have
“ this further direction to give, that when the corns

“ are cut down, and brought into the threshing floor,
 “ we should even then think of making provision of
 “ seed, for the future seed time ; for this is what
 “ *Celsus* says, where the corn and crop is but small,
 “ we must *prick out all the best ears of corn*, and, of
 “ *them*, lay up our seed separately by itself. On the
 “ other hand, when we shall have a more plentiful
 “ harvest than ordinary, and a larger grain, whatever
 “ part of it is thrashed out, must be cleansed with
 “ the sieve ; and that part of it which, because of its
 “ weight and bulk, subsides, and falls to the bottom
 “ of the sieve, must always be reserved for seed ; for
 “ this is of very great advantage, because, unless
 “ such care be taken, corns degenerate, though more
 “ quickly indeed in moist places, yet they do so also
 “ in such as are dry.”

This ancient, but most intelligent, and accomplished farmer, and writer, was thus fully aware of the importance of selecting the finest, and choicest wheat for seed, evidently aware also, from the circumstance of his alluding to the heaviest wheat, sinking to the bottom of the sieve, that the most farinaceous wheat, was the most nutritious, and best fitted, for the purpose of nourishing the young plant, in its embryo state. Nor can there be a doubt, but that the most plump, well grown, and perfectly ripe wheat, is the fittest for seed.

It has frequently puzzled me much to imagine,

upon what principle, some writers have recommended for seed, a sort of inferior grain, the refuse of a crop, after all the best had been sent to the market. How a principle so entirely contrary to the whole economy of nature, which usually produces the finest progeny, from the healthiest, and most robust parents, the same being improved, or weakened, in proportion to proper, or improper, nurture and culture,—could for a moment obtain, it is difficult to conceive ; but it was merely argued, that because a large quantity of sickly seed was sown, and that a portion of it grew, and produced a fair crop, it might be considered safe practice. Even from the finest seed after five years of experiments, I am persuaded that for a crop one-tenth, of the best grain perishes, or is destroyed by birds, mice, or insects ; but from some sorts which looked sickly, and were purposely tried, sown singly, grain by grain in 1833, I found that a liver coloured variety, which from the appearance of the ear, promised to be highly productive, though the grains were ill grown, thirty-three grains out of seventy two, died—which induced me to discard it as being too delicate, its grains being poor, and lean, though grown on a rich, and well prepared soil. Another variety, also from poor, ill fed wheat, lost forty nine grains, out of sixty two. A sample of Golden drop, which I got at Mark lane, tolerably well grown, had seven varieties in a handful, and thirty four of these died, out of seventy two

grains. Whereas from other healthy plump grains of several varieties, only nine, ten, and twelve died, out of seventy two grains of each variety.

Columella, also, entertained an idea regarding the degenerating of wheat, which is still entertained by modern farmers, quite erroneously in my opinion; the causes of which according to my view of the question will be explained in the succeeding chapter.

In 1834 the "Belle Vue Talavera," was so well grown and plump, that of three rows of seventy two grains each, not one died; of No. 1 Dantzic, only three to four, in three rows of the same number; and of No. 2, "Album Densum" only eight, from the same number died.

From one hundred and forty four grains, of a new white spring wheat, a very rare, hardy, and promising variety, only ten died. Hence with both farinaceous and productive habits, I think I am also combining hardy qualities, selected from among forty, or fifty sorts, which habits and qualities, I am more or less acquainted with, as far as regards this climate.

My general observations lead me to believe, that where wheat, appears to grow lean and poor looking, it should be discarded from the locality after a fair trial, say, after the third year, as the second, only, might be the result of climate, or the want of being naturalised to the soil.

The first trial should be made from seed of the

best quality, if this fails after the third year, it evidently is unsuited to the soil and climate, and a new sort should be introduced.

It must be obvious, that lean and shrivelled wheat, is not so likely to nourish the young plant just starting from its embryo state into life, with a mere miserable skin of a parent to live upon, as the fine rich nutriment to be met with, in a plump, round farinaceous grain, full of meal. As well might a farmer expect to have a fine fat skipping calf, from a poor lean Cow, fed or rather starved, on Dartmoor heath.

CHAPTER X.

ON THE TENDENCY OF WHEAT TO DEGENERATE.

THIS term “degenerate,” is in common use among farmers, from a want of having duly reflected on the subject, and accepting for truth, the traditions or sayings, which become proverbial from father to son.

If I rightly understand the signification of the term, it should mean, that the wheat, has changed its nature, it has become of an inferior quality, less productive, and less suited to the soil than when originally sown. Now, having shewn the very considerable difference of produce in various varieties,—some producing nearly double what others do ; it stands to reason that if a farmer procured, what he used to consider a fine sample, apparently tolerably pure—and that a few grains, of a productive, but coarse sort, were intermixed with it, say for the sake of argument, fifty grains in a bushel, on the average, that this variety produced sixty grains to the ear, with an average of eight tillers to each grain ; here would be, four hundred and eighty grains, the produce of one single ear, multiplied by the *fifty grains* in the bushel, or 24,000 grains in the produce of each bushel of an inferior sort, in the crop, the following

year. The second, or third year, if careful attention were omitted in the selection of the seed, from the original sort meant to be produced, the crop would be thus almost *changed*, not *degenerated* : it would be no fault of the superior sort first imported, but wholly the consequence of neglect in not having preserved it pure ; for the original sort would remain the same, as regards quality, but diminished in quantity. So it will be in a greater or less proportion, with each of these varieties, that lurk in a good crop, which they deteriorate in proportion, to their inferiority, either, in point of produce of meal, or straw. This is the case, even among the careful selections which I have made, for in the operations of thrashing, winnowing, or preparing corn, by washing, or pickling ; with all the care imaginable, corn is of so small bulk, that some stray grains, if several sorts are grown on a farm, will invariably lurk, and get into the most pure crop—this I hold under such circumstances to be almost inevitable, but where only one or two, good, and suitable sorts, are cultivated on a farm, mixtures ought to disappear altogether ; and the stock continue pure, as long as proper attention is paid. This should be done by methodical arrangement ; first, by seeing the seed corn intended to sow down an acre or two, as future stock for a large farm, carefully selected by hand, if necessary. That sown by a drill machine, with a double distance

between each sowing of the drill, to enable a careful person, to reach from each side to the middle of the drill, when the wheat is ripening, to cut off any ears foreign to the crop. A guinea expended in extra labour in this manner, would amply repay the farmer, in the future beauty, and produce of his crop.

When the sheaves are tied I further send a person round them, to see if all strangers to the crop are excluded from it.

All this may appear discouraging, but what success is to be obtained in this, or any other profession, (for I do not hesitate to call farming both a science and a profession,) without mental application, added to the "*sweat of the brow*," in order to learn how to cultivate the soil with proper skill.

A very good farmer in the Lothians, sent me a sample of wheat of his own growth—it had been intended for a white wheat, and was called so, but most of the white grains were ill grown and poor, whereas, a few grains of a red variety, mixed in the sample were very plump and farinaceous, evidently marking that the degenerated or red sort as it probably was considered, was that, which would have ensured a heavy, well ripened, and remunerating crop.

I trust that the growing of seed corn, for particular localities, may become a distinct branch of the Agricultural profession. I do not feel envious of those admirable establishments the nursery, gardens

of the Kingdom, which hourly clothe the face of the country, with new beauties, and refresh it with delicacies—the result of close, and scientific investigation, extracting like bees, sweets from every climate under the Sun, and naturalising them to a soil so foreign to many of their habits—yet I do hope to see, a species of nurseries for wheat, established in all parts of the Empire, where it will be known what sorts of wheat are best suited for its different soils, whether of clay, lime, sand, granite, or other bases.

It must inevitably stand to reason, that the fine white wheat which is grown, on a rich fertile loam, suitably retentive of moisture, can not be the proper sort to be sown on a poor black soil, such as Bagshot heath, which of itself is incapable of retaining, or attracting moisture.

But it will not be denied, that if a red, or coarse variety, equally productive as to quantity, though perhaps less farinaceous, could be grown on such a soil, it would be an end greatly to be desired, and of much national importance.

An observation which I made, leads me to believe, that such will be the result. In a piece of land, which had been ill prepared, and was poor and out of condition, a crop of white wheat had been sown; it scarcely grew three feet in height—but among it, was a plant of fine, tall, rich brown wheat, with a large round,

but rather coarse grain. It proved a highly productive variety. Had I happened to have sown the field, with all such, instead, of having only had twenty bushels per acre, I should probably have reaped forty.

Surely the attainment of such results, ought to be a matter of grave enquiry, as a means of increasing the national wealth. It is not my object however, to write a treatise on political economy, but I shall not hesitate to point out, what appears to me to be a legitimate, and certain mode, of augmenting the capital of the Kingdom, by the means of husbandry, now in so depreciated a state.

The importance of the exact adaptation of plants, or their varieties to particular soils, has lately been hinted at, in other terms it is true, by a Medical Professor of great talent, and research; who has traced the origin of the Cholera in India, to improper food, or to the use of ill grown and vitiated rice. There can be no doubt, that if wheat unsuited to a particular soil be sown, the chances are, that it will not be properly ripened, especially if in a moist or northern climate, where September or October weather may catch it; under such circumstances, the crop must be reaped, thrashed out, and perhaps sold at a low rate, at all events some body must eat it, so that an unripe, impure, deteriorated aliment is circulated, to the injury of some portion of society; had the seed been such as suited the soil, the contrary might be ex-

pected: a well ripened crop, enabling the farmer to pay his rent; and a wholesome nutriment being brought into the market. Ten or Twelve years ago, a very beautiful looking crop was sacrificed in the following manner. It was about the period, that a good deal was written and circulated, respecting the great advantages to be derived, from cutting wheat, while the grain was not fully ripened, as a means of considerably increasing the quantity of meal.

It was therefore reaped in an almost green state, while the thumb nail could be pressed through the grain, the consequence was, that it shrivelled, and I imagine never dried, for when it was ground into meal, and prepared for baking, the dough would not rise, and the bread it produced was so heavy (absolutely lead-like, and indigestible,) that it was unfit for ordinary human stomachs, and nearly the whole crop was given to the pigs.

It will not answer to run into extremes, in farming, all beginners should deviate from the usual practice with caution, and commence with small experiments, which when established to be on correct principles, can be extended with safety.

CHAPTER XI.

ON THE DISPOSITION OF WHEAT, TO SPORT.

HAVING doubted the general tendency of wheat to degenerate, I will now endeavour to shew how such an accident may occur. From careful observation, it appears that some varieties if sown the same day, differ in their period of flowering, many days: even ten or twelve intervening. Hence a farmer who might be desirous of cultivating two or three sorts on his farm, by attending to this circumstance, would scarcely stand a chance of intermixing his crop: as fecundation could only take place at the time, that each variety blooms.

He might further increase the difference of the period, by sowing the earliest kind on the warmest exposition. Where the varieties flowered at the same period, there would certainly be danger of alteration in a future crop. The knowledge of the period of blooming of every variety should therefore become a science.

It is very extraordinary that some sub-varieties, (they should be called,) have a predisposition to sport, or to alter their appearance. A fine red sort No. 7,

in the original experiment, (see the first table,) was sown with the others, pure apparently, but to my great surprise, even to that of Professor La Gasca, who witnessed the whole arrangement of it, and classed the sub-varieties himself, out of three hundred and fifty ears, the produce of forty six grains, there were two hundred of the original sort, which were a red compact hoary or velvety kind, twenty one ² ears of a smooth red, eighty six of a whitish downy ³ appearance, and forty three smooth chaffed white ⁷ ears. It might be conjectured that the original or parent ear, having been discovered in a field of mixed white corn, had been impregnated by the pollen of four different sorts of wheat, which the peculiar conformation of an ear of wheat might admit. Professor La Gasca classed the original sort as a seedling.

Another instance of this propensity to sport, I found in a Kentish downy seedling of an unusually square compact form, bearing a fine white plump round grain. I was anxious to propagate this, as it appeared so close and compact in its form, that the wind was not likely to have much power on it; it was accordingly sown in 1833, but I had the mortification to find, that it produced a great number of smooth ears; though there was little difference in the appearance of the grain; I therefore set that produce aside, and tried to raise it from a single ear

again in 1834, but from 72 grains, whereof 13 died—eight ears were of a smooth sort, so that I considered it incorrigible, and have withdrawn it as a subvariety, constantly liable to change.

The Talavera, flowering much earlier than any other, is sure to continue pure, unless stray grains happen to be accidentally mixed with it. No. 1, which I call Jersey Dantzic, flowers ten days later, and is very little disposed to change; I suspect, the taller wheats are not liable to be impregnated, by the shorter sorts, but the contrary to be the case. It is of consequence therefore to endeavour to keep all those varieties, which are found to answer the purpose required, as far apart from each other as possible.

One sort that I grew close to some others, in the course of experiments, so far from having any affinity for them, actually exhibited a sort of dislike or shrinking, from some of its neighbours; it occurred in a very rare sort, of spring wheat, bearing white grains (most spring wheats bearing liver coloured dark grains) this absolutely took a curve, even contrary to the prevailing winds, from a winter wheat planted fourteen inches to its left, and bent towards some rows of spring wheat which were on its right, this last, another variety, showing no predilection, or dislike, towards either of its neighbours. Hence I am led to imagine, that from some unknown deli-

cacy of habit, it loathed as it were the neighbourhood of the winter wheat, and leaned towards its summer neighbour. This was the more remarkable as the periods of flowering of the summer and winter wheats, were not the same. I therefore conclude, spring wheat may be sown with perfect safety by the side of winter wheat, without any fear of intermixture.

I hold it to be of paramount importance, to ascertain, and keep a note of the period of flowering of each variety to be cultivated, on extensive farms, which will tend more to the keeping up a pure sort than any other method, care being taken also to cause the barn to be well swept, as each sort is finally disposed of.

It may be of no small importance, to be able to sow spring and winter wheats at the same time, for it must be clearly understood that many spring wheats will stand the winter, as well as winter wheats, and as they would then invariably flower at different periods, it would be a certain mode of ensuring pure crops; besides attaining another essential object, that of having flour of a moist nature, from the spring wheat, to mix with the dryer flour of the winter variety.

CHAPTER XII.

ON THE EARLY HABITS OF SOME VARIETIES.

It has long been the practice with intelligent farmers, to procure seed wheat from warmer climates, especially those in the North, to whom it is important to obtain seed that may ripen a fortnight earlier than that of home growth.

The chances are, that such wheat having the best and warmest weather to ripen in, will have attained its full state of maturity, hence not only be the most productive in farina, but also the fittest for seed.

I have had occasion, this season, to satisfy myself by observation of the excellence of such practice—through the kindness of the late Secretary to the Devon and Cornwall Horticultural Society, Mr. Hamilton, I was enabled to sow seven grains of the Victoria wheat grown on Dartmoor heath—they were very poor and lean, however five of them grew, throve and ripened among my select varieties. They were sown on the 10th of November, in order to compare the produce and volume of their grain, with some of the same sort, which were to be sown on the 29th of March following—they rose on the seventeenth day, were in ear on the first of June, were in flower on the tenth, and were ripe on the 23d of July.

Those sown on the 29th of March were on a light soil in a warm exposition, they came into ear on the 19th of June, flowered on the first of July and ripened on the 20th of August. The first of these two experiments establishes that it is a hardy variety as it stood the winter perfectly ; the ear and grain is also finer and plumper, than that sown in the spring. The term “ Tremois” wheat, however, does not apply to those climates, which are not sufficiently warm, to force the growth of corn so as to ripen it in ninety days ; this having taken one hundred and forty four to ripen. Two samples of seed wheat from the Cape of Good Hope, one which I obtained through the attention of Mr. Collier, the Member of Parliament for Plymouth, and the other from a friend to whom it had been sent as a particularly fine sample, for seed, which it really was, led to some interesting observations. I was anxious to succeed in raising wheat from the Cape, as it has been questioned whether wheat which has crossed the line would vegetate —this being stated in “The Farmer’s Series, No. 74” of the Library of Useful Knowledge, Article, British Husbandry, Chap. x, Page 156. “ Some fine species have lately been imported from the Cape of Good Hope, and from Van Dieman’s Land ; but it was found, when sown on one of the finest farms in Bedfordshire, that it would not grow ; and it is said, though we know not with what truth, *that* “ *scarcely*

any wheat is ever known to vegetate in this country that had crossed the Line, unless particular care be taken to preserve it from the effects of the atmosphere."

Hence it became an object of no small interest to succeed in raising it—it was with great satisfaction therefore, that I perceived both samples growing freely in November last.

In the Spring, their growth, was quite different from that of any other wheat near them, whether from Dantzic, Poland, Carraccas, Essex, or this Island. It was much more upright, bushy, and of a lighter green, and trailed and tillered less. It put on also, a rather sickly appearance as if suffering from the cold. It came into ear on the 26th of May, six days earlier than the Carraccas wheat, but came into flower two days later, on the 12th of June, and only ripened on the 28th of July, five days later than the Victoria wheat, which had been sown the same day.

It is to be observed that, there was much bearded or spring wheat among it, which appears, on first acquaintance, to have nearly similar habits, as the winter wheats, it came among, but seems to be very fine. Its real value will be ascertained by comparison with other spring wheats next year.

The sickly appearance alluded to above, in the Cape wheat, was indicative doubtless of a yellow description of smut, that appeared in it in June,

which I had never observed previously to infest my wheat ; it destroyed many of the grains, some of them being reduced to a mere shell, or skin, containing a small worm.

A most singular circumstance, may be noticed here ; I had sown sixty three drills of this same seed from the Cape, on the 29th March, in a field having a considerable reclination to the Southward—a warm yet exposed situation. A great quantity of the seed perished, but all that rose, had a healthy appearance, of a dark green colour, quite different from that sown in the garden ; it came into ear on the nineteenth of June, flowered on the first of July, and ripened on the tenth of August, not a single ear was infected with the yellow smut I complained of, in the experiment made in the garden among my select varieties. Hence it is clear that, this wheat from a hot climate, when sown in November on flat land suffered much from the cold and wet, where the very same sample of seed sown so late as the 29th February, on a warm slope exposed to the rays of the sun, found a genial and somewhat similar climate to its own, and succeeded perfectly. It is not unlikely, that the produce of this last, sown with judgment, a little earlier, and in a warm exposition may become a valuable importation, and preserve early habits for more northern climates. Some which was given me as “Kubanka,” a thin liver colored wheat which was exhi-

bited before the Channel Islands Committee in 1835, turned out to be a Spring or bearded variety ; it came into ear on the 1st of June, flowered on the 18th, and ripened on the 10th of August. It does not tiller much and appeared so like barley that I was doubtful what it should be ; it was a perfectly pure sample though much of it died. The Ducksbill, a very productive sort from Kiel, in the Baltic, is said to produce meal fit only for pastry, it is the finest ear that I have seen ; a cross with a variety producing a light dry meal would be highly advantageous—its habits are late, as it came into ear on the 12th of June, and flowered as late as the 29th, it however, ripened on the 6th August. The Golden drop, a fine brown eared variety is equally late. This is a very farinaceous sort, probably one of the best of the red wheats, on which as well as on spring wheats I shall treat apart, —my present observations being chiefly confined to white wheats, which are the first in order as to value.

CHAPTER XIII.

ON THE PROPERTIES OF SOME VARIETIES.

I have stated the relative weight, and fineness of quality, of the varieties, delineated in this volume.

It may be well to say a few words in respect to their relative value as to produce of straw. It is stated in the excellent work I have already quoted, at the Article "British Husbandry" Chap. X, Page 154. "The straw is generally reckoned to be about double the weight of the grain ; an Acre, producing three quarters of wheat of the ordinary quality, may therefore be presumed to yield about twenty six hundred weight."

If the results obtained by my experiments are of any value, the quantity of Straw produced from a single ear of the best varieties, namely, No. 1, Jersey Dantzic, one of the best varieties, produced three pounds three ounces of wheat in round numbers, dropping the fractional parts, and three pounds nine ounces of straw, only six ounces more straw than wheat. No. 2, "*Album Densum*," produced two pounds twelve ounces of wheat and eight ounces more straw than wheat. No. 5, "*Coturianum*," six more straw, than grain, and No. 8, "*Koeleri*"

four pounds four ounces of grain, and only *three* pounds thirteen ounces of straw. The next, No. 9, the Red compact, produced only two pounds, nine ounces of wheat from three pounds fifteen ounces of straw, an excess of one pound six ounces of straw over the grain in the last sort, whereas in the former, No. 8, a most excellent and superior variety, there was an excess in grain, of seven ounces over the straw—It must be obvious from these facts that by a proper system of culture, wheat should be brought to such perfection, as to produce more grain than straw, Nos. eight, ten, and thirteen having done so—but I particularly allude to No. 8, from its being an exceedingly valuable variety, in every respect, with the exception of retaining moisture in the ear, a considerable length of time after rain, from its being velvet husked, or downy.

The observation from the “Library of Useful Knowledge” may be perfectly correct, as far as it regards ordinary husbandry, but it leads me to believe, what I have already hazarded to state, that the proper culture of wheat is unpractised.

It is a curious fact, that the fifth of a pint of seed of the Dantzic variety similar to No. 1, sown in drills, about as thick as a drill machine would have sown it, Nos 15, 16, 17, 18, and 19, should have nearly accorded with the statement, for with the exception of No. 15, which produced only three pounds six

ounces of corn, from about "*two thousand*" grains, they produced *six pounds ten ounces*, or very nearly *double* the weight of straw; corresponding with the extract above alluded to—whereas row No. 1 of the very same sort, from only *sixty one* grains, produced within three ounces as much grain, but little more than half less straw. These surely are startling facts, worthy the consideration of more able farmers than the writer.

The straw of No. 1, is of a beautifully white colour, very fine, but rather apt to lay in rich soils; the grain is tolerably tenacious to the husk, not much liable to shed. That of No. 2, is rather coarser and stouter; the grain is very tenacious in the ear. No. 5, has a short straw, white and slight, it is also little liable to shed the grain. That of No. 8, is still shorter, but fine, and excellent for fodder, indeed they appear to be among the very best, as cattle eat them all greedily; as I have before observed this last being a hoary, or velvet eared variety, may not be suited for a damp climate, as it retains moisture, for a considerably longer period, than either of the former sorts—but on dry uplands, it is highly productive, and valuable in every respect. In damp situations, the smooth eared sorts, both white and red, I apprehend to be the best. The Talavera I have raised from a single grain, has a slight white straw; it is rather apt to lay in rich soils,

the ear being apparently too heavy for the stem ; but a variety very similar to it which was given me by Professor La Gasca, that was sown on a poor soil this spring, came very fine in the ear, though it not being above three feet high in the straw, enabled it to carry its head upright. Should it continue to possess this quality in richer land it will be a great improvement in the variety ; this I shall be enabled to ascertain next season.

Mr. Knight the President of the Horticultural Society of London, has given some valuable hints with respect to raising new varieties from seed ; and has described the mode of intercrossing them, by impregnating the female blossoms of one variety with the pollen or fecundating matter, of the male organs of the other, which if not done with some degree of care and attention, being a nice and difficult operation, may produce many varieties, of habits peculiarly liable to sport. I imagine that the only sure mode of preventing such an intermixture would be to leave only one female blossom on the plant to be impregnated, thus insuring a single variety of the precise quality required.

There can be no doubt that with due attention, the practice can be established as satisfactorily, as the success that has been met with, by those who have attended to the intercrossing of Geraniums, now grown of all shades and colours, almost at will.

CHAPTER XIV.

CLASSIFICATION.

THE attempt to class the varieties of wheat, is necessary ; it is a laborious and difficult undertaking, which should be performed by a more scientific person than the writer. But as no one has yet done so, as a branch of Agriculture, in those plain terms which may be intelligible, not to the Botanist, or scientific reader only, but to the great mass of farmers, I shall risk the trial for those sorts that are in usual cultivation.

I leave to Botanists the seven species of *Triticum*, named in that very useful work, Loudon's *Encyclopedia of Agriculture*, also the attempt at classification that is made in Sinclairs very excellent book on *Grasses*, neither of these works, explaining what I should consider to be, the principal object in view, the nature and real qualities of each variety, as to their properties for making bread.

A gentleman who may be planting a garden, is desirous of having peaches, figs, pears, grapes, apples, even gooseberries, of particular seasons, flavours, qualities, and colours ; these are all named, and so intelligibly classed, that if the Nurseryman deceives him in one or two of them, he is set down as a person who is not to be depended upon : yet these luxuries,

which do not directly affect the real prosperity of the country, are perfectly well understood; but the nature of the most precious of all those plants, which one of the most profound writers has called “the only produce of land which always, and necessarily, affords some rent to the landlord,” appears to have been overlooked—perhaps because it was so plentiful, and so diminutive. If Doctor Franklin’s adage, “take care of the pence, and the pounds will take care of themselves, is true,” it is not less correct to say to a husbandman, in the selection of his seed wheat, “take care of the pecks, and the quarters will take care of themselves.”

To render the classification of wheat, well understood, it should be so clear and simple, that any farmer should be enabled to state the precise variety he wishes to raise, by applying to the seed merchant, a branch of business, which should belong to the corn trade.

I should propose a classification as follows :

BEARDLESS OR WINTER WHEATS.

Class.	1.	White Wheats,	Smooth Chaffed.
	2.	Do. Do.,	Velvet Husked.
	3.	Red Do.,	Smooth Chaffed.
	4.	Do. Do.,	Velvet Husked.
	5.	Yellow, Do.,	Smooth Chaffed.
	6.	Do. Do.,	Velvet Husked.
	7.	Liver Do.,	Smooth Chaffed.
	8.	Do. Do.,	Velvet Chaffed.

BEARDED OR SPRING WHEATS.

1. White Spring Wheat,
2. Red Spring Wheat,
3. Yellow Do., Do.,
4. Hoary Do., Do.,

The subvarieties, should be given a number and name, which number should be first added to the local names, given to each, for which one common name should be substituted.

ARRANGEMENT.

1st. The name of the wheat, and the particular soil and climate, it may be suited for, the proper period for sowing it, whether it be liable to injury from drought, moisture, or frost, in its early or later growth, and its liability to disease.

2nd. The period of flowering or blooming, and ripening.

3rd. The height and nature of the straw, whether it be white or dark colored, brittle or tenacious, if liable to lay in wet seasons, or otherwise. If fit for fodder, thatching, bonnet making, or other purposes.

4th. Nature of the ear, whether compact, or widely spread, its length in inches. This would of course vary in some soils, but it would be interesting to know such variations, the produce per acre.

5th. The colour of the grain, (this will also vary with a change of soil), whether coarse or thin skinned, whether round or oval, large or small, whether liable to shake out or not.

6th. Nature of the flour and bran, with their relative quantity.

7th. Whether the dough rises well or not.

8th. Quantity of bread made from a given quantity of flour, its colour, if of a dry, or moist nature, and the length of time it will keep.

SMOOTH CHAFFED.

In Class 1.—Nature and Habits.

No. 1. *Triticum Hybridum*, *Candidum Epulonum* *Leucospermum* “*La Gasca*”—No. 1 in the table. A variety from Dantzic—ear full and large, ranging from three and a half inches, to four and a half, in length. Grain, rather thin skinned, large, roundish, hardy. Tillers well, blooms rather early, tall, 4 feet 8 inches, tenacious white straw. Rather liable to lay in rich land, sheds if over ripe, produces excellent white bread of a rather dry nature. Eighteen pounds of flour have made twenty four pounds of bread,—has produced fifty two imperial bushels of 63 lbs to the acre.

No. 2.—*Triticum Album Densum*—“*La Gasca*,” No. 2 in the table, I suspect it to be the “*Froment Blanc de Hongrie*” of the French, ear, compact, square, from two and a half, to three and a half inches long. Grain small, white, round and thin skinned; hardy, tillers well, blooms a day or two later than No. 1; tall, 4 feet 8 inches, stout white straw, sheds little.

No. 3. *Triticum Hybridum*, *Coturianum à Compactum* *La Gasca*, M. S. S., a Seedling of 1832.



Jersey Danzig.

Triticum Hybridum .
Candidum Epulonum .
of La Gasca .

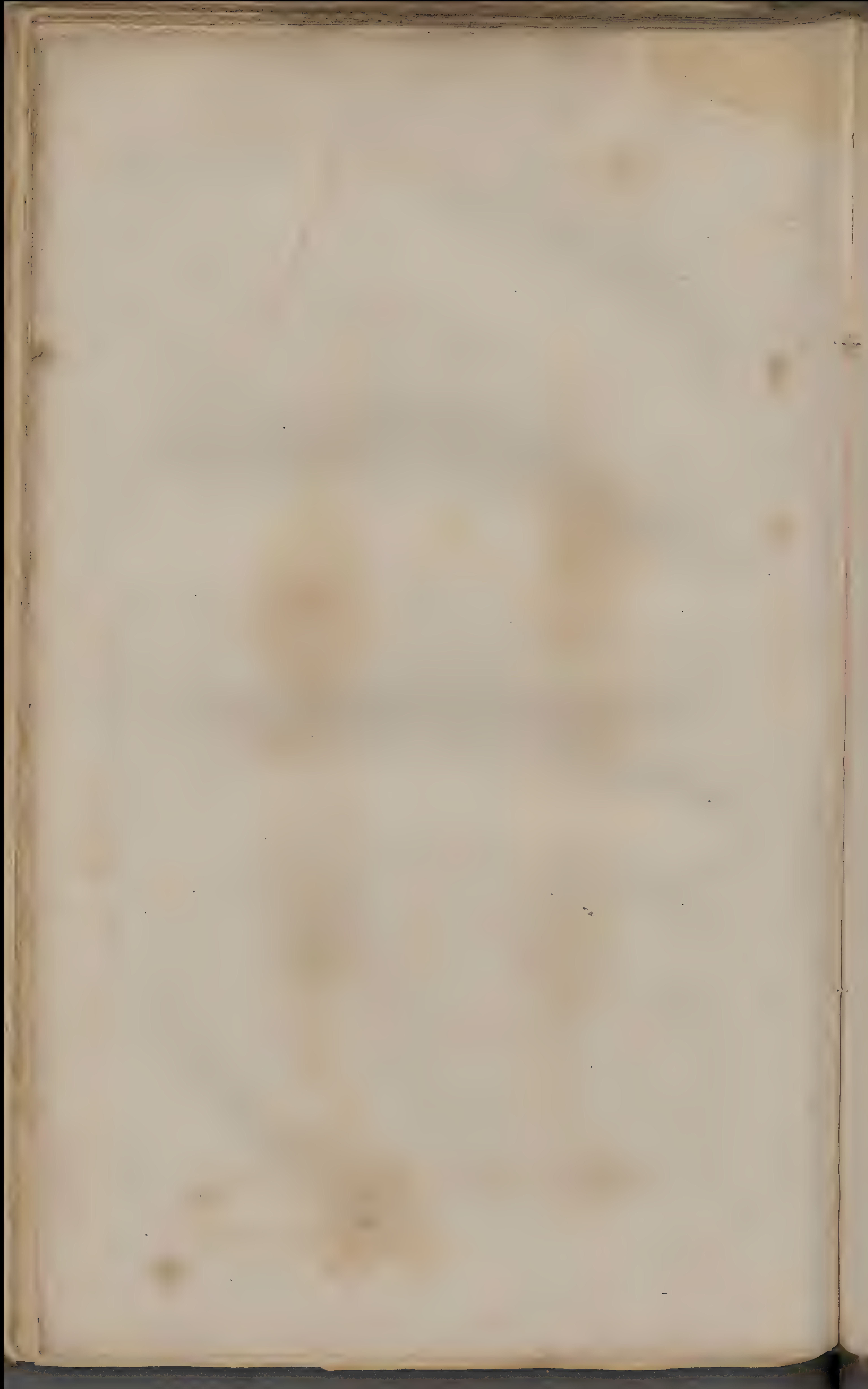
2



Small Round.

Triticum Hybridum .
Album Densum
of La Gasca .

J. Le Courcier: (after Nature)

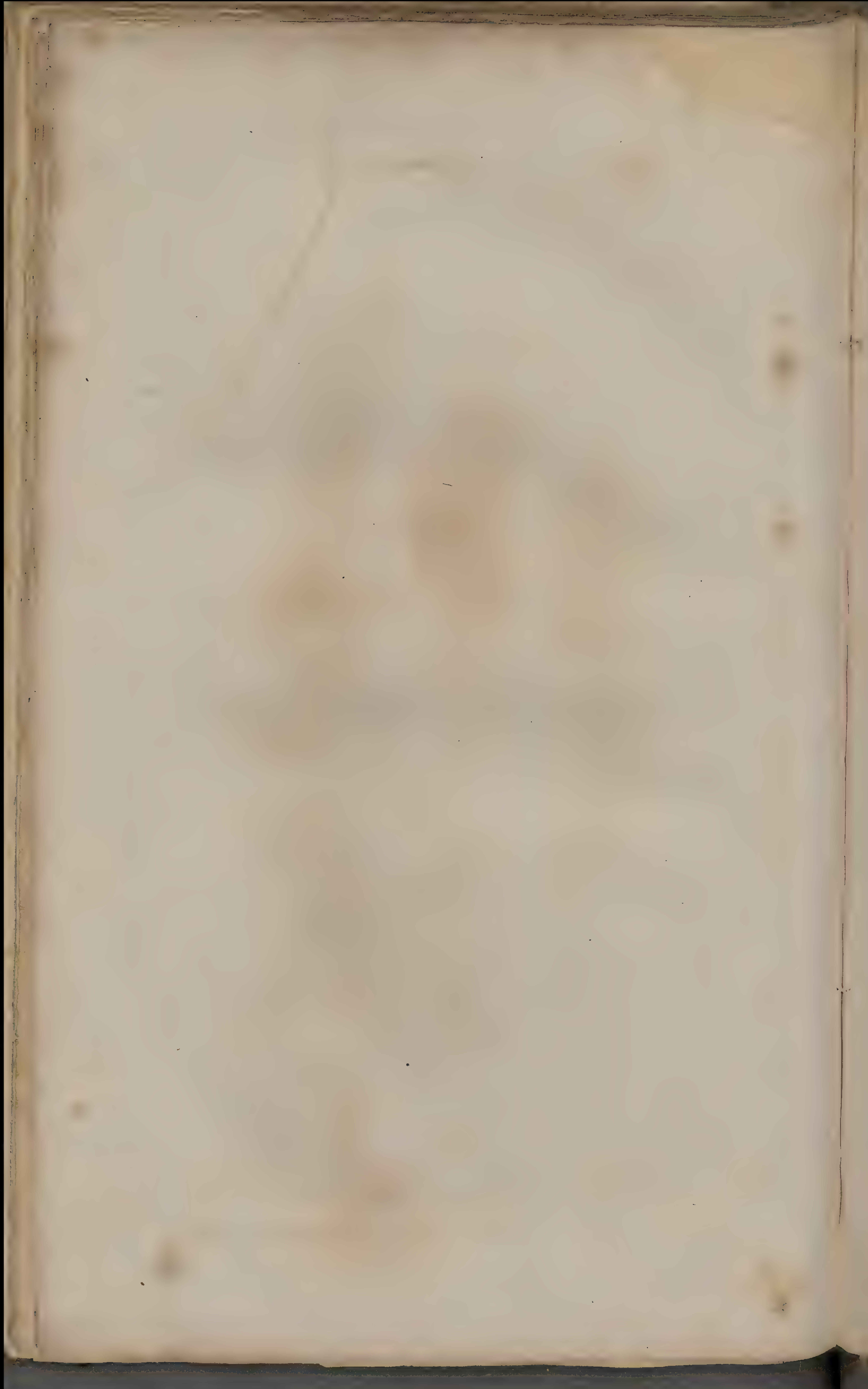




Triticum Hybridum.
Coturianam à Compactum.



Talavera Beluensis.



Class 2. Velvet Husked White Grain.

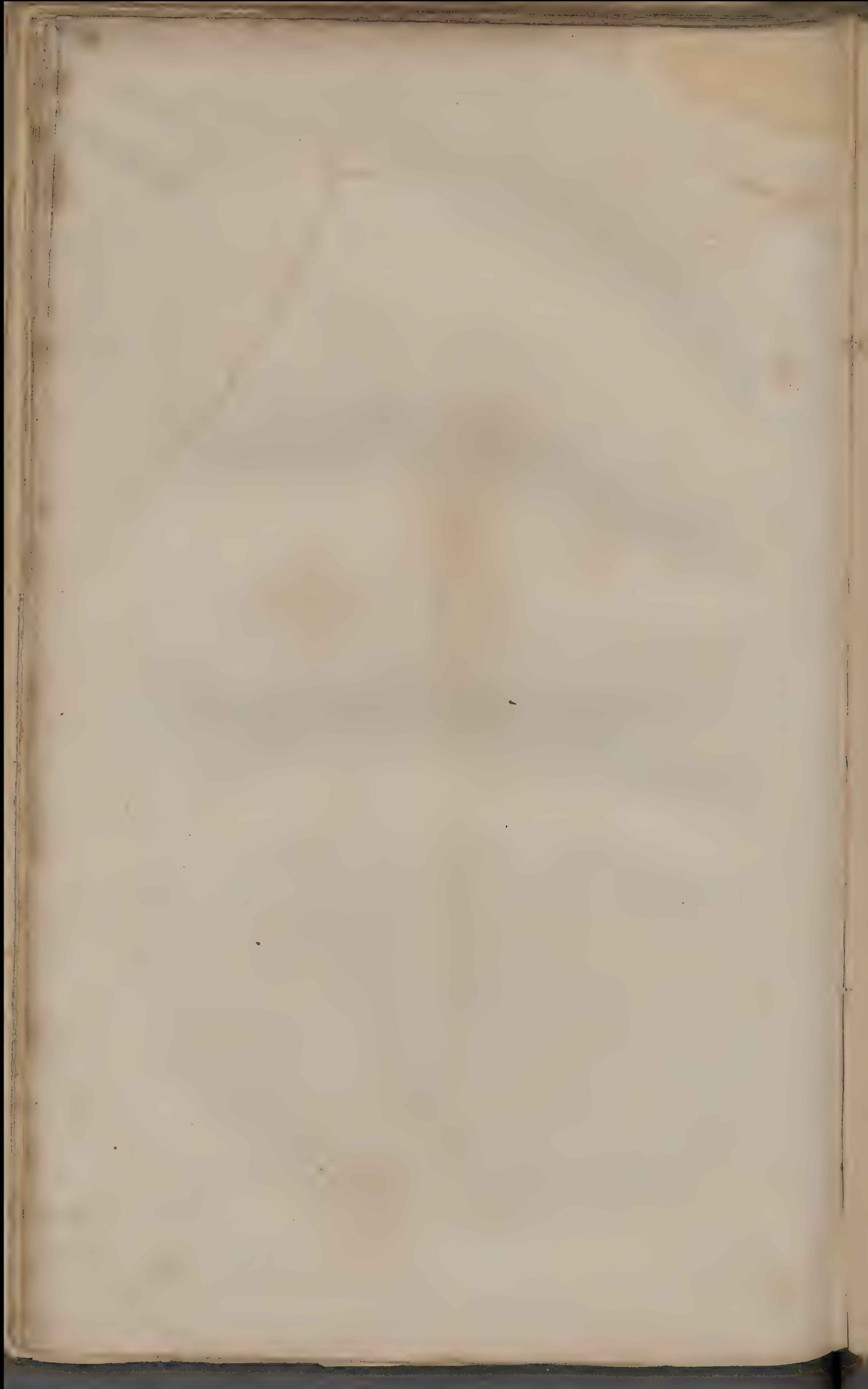
1. Hoary.



Triticum Koeleri

of La Gasca.

J. Le Conteur. (after Nature.)



No. 7 in the table. Ear short and compact, not quite so square as No. 2 which it otherwise resembles externally, from two and a half to three inches long, grain, plump and oblong, rather coarser skinned than No. 1, hardy, tillers remarkably. Blooms rather earlier than No. 2. Straw short and slight, four feet high, not at all liable to be laid. Sheds little, highly productive having afforded fifty eight imperial bushels to the acre, this season.

No. 4. *Triticum Hybridum*, Talavera Belvuensis. Ear Long, Straggling, and Pyramidal, from four to six inches long. Grain large, oblong and thin skinned. Tillers moderately. Earliest to bloom, eight or ten days sooner than the three preceeding sorts. Straw tall, slight and bending, and brittle if over ripe, liable to lay in rich land, highly farinaceous.

In Class 2.—Velvet Husked. White Wheat.

No. 1. *Triticum Koeleri*.—*La Gasca*, 1832. Ear large, rather close. Downy or velvety. White very plump, roundish, oval, thin skinned grain. Tillers remarkably. Blooms rather early. Straw four feet four inches to four feet seven inches, very white and firm, not liable to shed, retains moisture from its huskiness, therefore should be harvested when dry, has produced twenty six pounds of superior white bread from eighteen pounds of flour, and has produced fifty five imperial bushels of 64 lbs the acre.

Such is the sort of classification I should wish to introduce, not one in a dead or botanical language,

intelligible only to men of science, but one in the mother tongue which every farmer may comprehend, and by comparing his class book with the crops, or varieties that are lurking in them, may ascertain which they are.

This is merely a first suggestion, time and further experience, guided by the experiments this little book may lead to, may prove the means of distinctly ascertaining and making known the habits and properties of all sorts of grain.

CHAPTER XV.

ON THE RELATIVE ADVANTAGES OF THE DRILL OR BROADCAST SYSTEMS.

MUCH has been written on this subject which still appears debateable. My own observation leads me to believe, that it rests mainly on the knowledge, skill, and long practice of the farmer. If a skilful and intelligent farmer, has for a long series of years, hoed, manured, and treated his land, *so as to have* eradicated all the seed weeds from it, and it remains, in so clean a state, that nothing but the intended crop will germinate; then indeed I should say the broadcast system would afford the greatest produce. But if the case be with most farmers, as my own, that the land to be cultivated, is loaded with the seeds of many descriptions of noxious weeds, then I contend, the drill, or partly fallowing process, is that, which is alone likely, to enable the farmer to obtain a compensating return from his crops. I have observed a field of wheat sown broadcast in very good rich soil, so completely overrun with weeds, that at the very lowest computation, two thirds of it was lost. In every case where the ordinary means are adopted, whether the expensive process of hand weeding, or the much less costly mode of hoeing broadcast, it is

attended with manifest risk if not most carefully and attentively performed, as any of the young tillers that may be drawn or cut, will reproduce fresh ones, the ears from which, ripen a fortnight or more, later than those which were uninjured; and the crop from such a mode of culture can never be, in the most fit state of ripeness for harvesting.

By the drill process, just before, or about the period, that the wheat is forming its coronal roots, which, from wheat sown on the 18th January, I found, as may be seen by the plate, to be on the 17th of April, there is ample time to have it, lightly but carefully hoed, so that the weeds may be completely destroyed, and the coronal roots find a well stirred soil to work in; moreover the plants, being in a free atmosphere between the drills so cleaned, which the weeds previously to their destruction, breathed in common with them, have the whole benefit of the soil.

Those who desire to sow clover and rye grass, in the Spring, will find it to be good practice, to sow them a day or two before the first hoeing is given, as the same stroke which destroys the weeds, mixes the grass seeds with the soil, which then take possession of it sooner than a second crop of weeds; but this mode which I have found successful, in regard to the future hay crop, is, I consider, at the cost of several bushels per acre on the wheat crop.

My own practice is to put my seed wheat into fresh water, two or three bushels at a time, then stir it, till all the light, injured, or sickly grains, are floated, or skimmed off; the grain thus cleaned is put to soak twelve hours in brine, made strong enough to float a potatoe; it is then put to drain, and is well dried with air slacked lime—no smutty ears appear after such treatment. The land is prepared by two or three ploughings, and a dressing of lime, ashes, or some suitable manure, according to the change required in the food of the seed. The wheat is then sown with a five row drill machine, one of very efficient and simple construction, made by *Snowden*, of Oxford Street, in drills seven inches apart, at the rate of two, to two and a half bushels the acre, after potatoes, or parsnips.

One careful hoeing in April or May, is then sufficient to enable the wheat, to get the upper hand of its enemies the weeds, for which purpose I use a hoe of my own invention, with a very narrow steel blade, not wider than a table knife, with a stout blunt back, and a very sharp edge, the sides being rounded off like some cavalry stirrups I have seen. The workman is thus enabled to place the back of the hoe, against the very roots or tillers of the wheat, and thus scoop out any weed from them. In hoeing straight along the drills, the work is performed very speedily, as the round projecting sides of the hoe

guide the labourer, and prevent his cutting the plants, the blade being so narrow prevents any accumulation of earth on the hoe, which glides or cuts through the dry surface with great ease, and scarcely any resistance to the person using it. Women or even children can handle it with facility. My gardener has adopted it for all his drilled crops, finding it a safe, commodious, and very powerful instrument. The clover and grasses, are sown immediately after the crop has been harvested, which has been found to answer remarkably well, though at the expense of one additional ploughing, a practice I have adopted, having observed it to be corroborative of Mr. Sinclair's experiments, who states in the "*Hortus Gramineus Woburnensis*," Page 248, "I have sown the seeds of the same grasses in every month of the year, January excepted ; and though much depends on the weather and state of the ground, the results were always in favour of the month of September, and the beginning of August ; and next to that, the middle or latter end of May according as the weather was dry."

This principle is obviously in accordance with common sense, for in the first place—the wheat crop receives the whole benefit of the manure which was intended for it, without being deprived of any part of it by the grasses, the land also is at it were, partially fallowed by the hoeing, in the spaces between the drills, and is thus cleared and prepared for the

grasses, at the most propitious season of the year, according to the high authority just quoted—while the stubble that is lightly turned in, is itself a manure for them, and keeps the soil open and light, in a proper state for the young seedlings.

Fallowing for a whole season is altogether too expensive a mode, to be adopted by those, who pay a high rent for their land, as paring and burning, and the drill system, or a sort of half fallow will answer the purpose equally well. From land in a very bad state infested with couch grass in 1832, by means of paring and burning, previous to taking a crop of potatoes, which produced thirty four thousand eight hundred pounds of saleable potatoes the acre, and with an after dressing of forty bushels to the acre, of kelp or sea weed ashes, I raised forty bushels of fine wheat to the acre. One season I raised fifty five, and last season fifty one bushels to the acre; this year I hope to have reaped as much with drill husbandry though on land in a very bad state, which had been much neglected.

These are not mere assertions without proof, as a reference to my corn and millers book, would furnish all the details.

It may be seen what a perch of ground might be made to produce, by multiplying the nineteen rows exhibited in the tables, by the produce of *No. 8, Koeleri*; which would give eighty pounds weight to the

perch, or ninety bushels to the acre. Now, extraordinary as this may appear, I have no doubt that land, in a perfect state of tilth, and with seed suited to the soil and climate, may hereafter be made to bear that quantity.

Herodotus mentions an encouraging fact, which should lead farmers to hope, not indeed to rival the produce of wheat in Egypt, but greatly to increase their own. In his *Clio* it is stated “ of all countries which have come within my observation, this is far the most fruitful in corn. Fruit trees, such as the vine, the olive, and the fig, they do not even attempt to cultivate ; but the soil is so particularly well adapted for Corn, that it never produces less than *two hundred fold* ; in seasons which are remarkably favorable, it will sometimes rise to three hundred : the ear of their wheat as well as barley is four digits in size. The immense height to which Millet and Sesamum will grow, although I have witnessed it myself, I know not how to mention, I am well aware that they who have not visited this country will deem whatever I may say on the subject, a violation of probability.”

This elegant and authentic historian, who flourished about four hundred and fifty years before the Christian era, speaks of wheat producing two or three hundred fold—it is true the soil and climate of Egypt, are both highly favourable to the growth of wheat,

but the produce is not extraordinary, if compared with the produce, from single ears of corn ; as No. 7, which produced four pounds four ounces from fifty six grains, reckoning 9,000 grains to the pound, is a produce, between six and seven hundred, for one. Hence may not British culture be hereafter brought to equal Egyptian produce ?

CHAPTER XVI.

RESULT.

By the evidence of Mr. Jacob, before the select committee on Agriculture, in 1833, whose authority is unquestionable, the average consumption of wheat, in the United Kingdom, may be about thirteen millions of quarters, and the average produce per acre, of England and Wales, is about twenty one bushels; this for the sake of argument I assume to be that of the whole Kingdom, though it will somewhat over-rate it for Ireland and Scotland; then, deducting the average importation of wheat, since the year 1828, or a million and a half of quarters, we have about four millions, four hundred thousand acres in wheat annually.

From the circumstance of some portion of the country producing less than that average, I will suppose the land under cultivation for wheat to be five millions of acres.

Now assuming the average price of wheat for the last five years, to have been fifty shillings the quarter, it will readily be conceded that any means that could enable the farmer to raise one quarter of wheat, nay half a quarter, more per acre, would not only be a

great individual advantage, but a very large increase of the national wealth; a nation is a great family, and whether it be merely a portion of the great family, a family of Rothschilds for instance, who are enriched by the intelligence, activity, and perseverance of one individual, or every individual who by the application of the same energies is enabled to increase his own income, it is still so much increase of the national wealth, augmented in the ratio of the number so actively employed.

It follows, if the mode I suggest, of raising wheat suited to each soil and climate, be adopted; it may reasonably be expected, in the course of three or four years, such is the amazing productiveness of wheat, that the country will be supplied with suitable seed; and it is a consideration to which I earnestly call the attention of the Chancellor of the Exchequer; an increase of one quarter per acre, may be made to take place; even more than this increase has occurred on my own farm, where three quarters per acre, was formerly the average, but has now gradually increased, in three years out of four, (one year's crop having been sacrificed to an experiment), from three or four, to six quarters per acre. Hence assuming the increase to be only one quarter per acre, instead of the two, or three, which have taken place on my farm; that increase on five millions of acres, at fifty shillings per quarter, would present an annual

augmentation to the national wealth of twelve millions five hundred thousand pounds.

But this would not be the whole advantage gained. It is further stated by the same respectable authority, that, one million and a half of quarters have been imported from abroad since 1828, which may have been purchased for about two millions sterling; or in other words, the English farmer lost that sum of money yearly, which he might have received for his wheat; but which was sent out of the country, and paid to foreigners. Again, these differences are merely calculated on the wheat; it is necessary to take into calculation the increase also, in the quantity of meal, that will accrue, when the system of classification, and the knowledge of the properties of each variety of wheat, is attained.

I have shewn that eighteen pounds of good Dantzic and Rostock flour, only made twenty three pounds of bread, also that eighteen pounds of a farinaceous variety of my own growth, have made twenty six pounds of bread. Here we have an excess of three pounds of bread on eighteen pounds of flour, or of one sixth, from two superior sorts of meal, and I shall rest satisfied to make my statements from these—though I am convinced, were I to make them from flour taken from the average mixtures which furnish the flour that is eaten all over the Kingdom, the increase would be greater.

In the farmers series, No. 74, at the article "on Wheat" we find, that a bushel of wheat averages forty eight pounds of both kinds of flour, of that sort called "Seconds"; hence if a superior sort of wheat be made to produce an increase of eight pounds of bread on every bushel; here would also be an increase of one shilling per bushel on ninety two millions of bushels, or of four millions six hundred thousand pounds a year, being a general increase of value in the produce of wheat and flour, to the amount of sixteen millions, nine hundred thousand pounds sterling; to which may be further added, the sum that is annually paid by Englishmen to Foreigners, for corn, or two millions more, being a total increase of eighteen millions, nine hundred thousand a year. I shall expect to be told that, these are mere idle and vain speculations, quite theoretical and visionary, but I claim for consideration the experiments of five years, and the facts that I have been enabled to deduce from them. I readily admit that to obtain the vast result I appear to jump at, a large and apparently unmanageable machinery would have to be put into motion, as well as the consentaneous action of, as it were a whole people. But if only half, nay a quarter of the result is attainable, it is surely worth the attention of the Government, as well as of the whole body of Agriculturists. It is not a system of harassing and vexatious taxation,

that I am advocating, to endeavour to relieve the country from a portion of the burthens which overcharge it ; but a course of regular, slow improvement, sure and infallible in its result, acting steadily upon the best feelings, and individual interests, requiring only a regular system guided by one firm and powerful mind, to put the machinery regularly into play.

It is not surely, because the suggestion is simple, though new, perhaps I might add comprehensive ; that it may not educe eminent and lasting benefits to the entire family of man. I am satisfied with pointing out this, as one of the means to relieve the Agricultural interest, without going into further details ; feeling persuaded that when the application of my principle shall have extended to red and yellow wheats, and spring wheats also, on neither of which, I have yet treated, but have made many experiments, to be published hereafter ; it will be seen that I have much underrated the mark. This proper adaptation of seed to particular soils, will have the effect of diminishing the risk of the farmer,—will therefore increase the demand for labour, and lead to an augmentation of the rate of wages.

The application of the principle is universal, I have therefore already sent some select samples to Persia, to North America, and to the West Indies ; I only wish it to be given a fair and patient

trial ; it is in the proper and general application of it, that the adage, " Union is Power," will be found ;— had I the means to set the machinery in motion, the result would be infallible, after the third or fourth seasons. It must also be kept in mind, that these results are calculated upon fair average crops, not on the differences which may exist, between some of the best, and some of the worst varieties, that I have set forth in the tables, annexed to this book ; nor on the extremes between crops in general cultivation.

If such were the case, the results would be far more considerable, as the difference between the best red wheat and the most inferior sort, is greater than the difference, in the white varieties. I shall further, shew, that the produce and value of spring wheats, is various, should the hints I have thrown out, have been deemed worthy of attention.

CHAPTER XVII.

CONCLUSION.

I have adverted in this little work to the opinion I entertain, that it is by the consentaneous exertions of the Agriculturists that they should hope for relief. I consider the establishment of a national experimental farm would be the first step to take—as I had the honor to recommend such a measure to the Committee of the Central Agricultural Society; instead of writing a separate chapter on the subject, I shall annex my report, merely adding, that a small steam mill, adapted for threshing and winnowing corn, grinding and sifting it into flour, cutting chaff, grinding bones for manure, and various other purposes, such as have already been established on the Duke of Gloucester's farmery, should be an appendage to the institution.

It will be observed by the annexed report, that it was foreseen, that the conclusion arrived at by the Committee of the House of Commons, on the 2nd of August 1833, on the corn question, precluded the expectation that relief could be hoped for, through the agency of a new Committee, which, strange to say, on a second enquiry, has come to no conclusion at all; though it is to be believed the original cause

of Agricultural distress is now beginning to be understood.

To that I shall not now advert, but proceed with my report, which follows :—

100 *Quadrant*, 20th December, 1835.

MY LORD AND GENTLEMEN,

Having been requested by a resolution of the Central Committee, of the Agricultural Society of Great Britain, and Ireland, held on the 17th instant, “to furnish a statement shewing the advantages to be conferred on the Agricultural Interest generally, by the establishment of an experimental farm, in the immediate vicinity of London”; I engage in the task with some diffidence, but with great pleasure.

It may be pardonable, previously to my entering on my subject, briefly to attempt to win the confidence of my brother farmers, to whose impartial consideration these observations are particularly directed, by shewing that the humble individual who addresses them unexpectedly for the first time, has some claims to it, having for the last eighteen years been ardently engaged in Horticulture and Agriculture; and though an Honorary Secretary to an Agricultural Society, it is not in name only, as he has earned premiums in fair competition, for the superior culture of wheat; growth of new potatoes from seed; new mixed artificial grasses; for the introduction of new implements of husbandry, and for stock.

The most ready mode of proving the utility of an Institution is by a statement of analogous facts, the result of experience. In July, last year, having read in a French Agricultural publication, an account of an experimental farm and school, at Coetbo, in Brittany, about 300 miles from my residence in Jersey, I visited it in the hope that it would be useful to the Society, of which I am Secretary.

It is situated in a beautiful and fertile country, well wooded and watered, but cultivated by the "Breton" farmers, just as their forefathers tilled it two hundred years ago. The College farm appears like a garden in a smiling wilderness, so far as culture goes. I rose at four in the morning in order to witness the whole course of labour in this interesting institution.

There were from eighty to ninety Students under the superintendence and tuition of a Director, a Professor of Agriculture, and Agricultural Chemistry, a Veterinary Surgeon, and an Agricultural Implement maker.

At half past four they took a slight repast, and as the clock struck five, all were employed, some in harnessing the oxen and horses; others in carting out, and properly disposing the implements in the field; others set to hoeing, others weeding, some ploughing, some hay making, in a word to the various labours of the season.

The School is divided into working parties of ten, at the head of each, is a steady young man of experience, called the "Decurion" who directs the work of his party. In all difficult operations, a regular farming labourer is at hand to perform them, but such is the ardour and perseverance of the youths, that they rarely allow any difficulty to arrest their progress. The duty of one decury or ten, is to dress, feed, and litter, the cattle with as much regularity as a Cavalry corps dress their horses, also to keep the farm yard in order; thus, all in turn, are made acquainted with every thing connected with a farm, whether in regard to horses, oxen, cows, pigs, or manures. These last are made and husbanded, with the greatest care, the mixons being formed of sweepings, leaves, and weeds that had not seeded, in alternate layers with stable manure.

The drainings of the stables, and straw yard, run into a tank to be pumped out when required as liquid manure, which is the best, most portable, but least known in this country.

The learned Professor M. Donker, who is an admirable practical farmer, as polite and as communicative as he is learned, complained that he had not sufficient manure. I urged him to burn the underwood, and decaying timber of the large adjacent forests, through which wide roads were cut, which would enable him to obtain an inexhaustible supply

of ashes, the best of manures, either for turnips or wheat ; the cartage of ashes being easy, and the quantity required to dress the land, not great: in which he entirely coincided.

At nine all come in to their studies, when they write remarks on the various operations of the morning. From 11 to 12 is the breakfast hour. From 12 to 3 is time for recreation and study, which embraces for the first class, questions of the following nature :—This farm of 600 acres, one eighth of which, is always to be in Beet root, is to be divided into the most eligible rotation of crops. Shew the most profitable course, and describe the nature and chemical properties of the soil in each field, the proper manures to be applied to them, the quantity of seed required for the crop, its culture, by previous ploughings, by after hoeing, or weeding, the cost and labour, and the probable return ?

The plan of farming given by some of the youths would have done credit to an experienced farmer, and demonstrated clearly that though theory alone in farming, is an absurdity, the combination of practice, with scientific acquirements, will soon operate great amelioration in the Agricultural world. From three to seven, they prosecute their labour in the fields, being eight hours work in the day. They then come in for dinner. At eight the Director receives the report from every Decurion, of the day's

work, of his party of ten. . He then orders the work for the ensuing day, giving a concise lecture on the subject when necessary, to the proper culture of any unusual crop. A library of Agricultural works is open to the Students, till bed time, a quarter past nine.

The greatest order and regularity prevails in this admirable establishment, which is supported by the French Government, and by voluntary contributions; there are two Students from forty departments of France, besides a few more who pay for instruction.

Some of them had been in the learned professions, of law, medicine, and civil engineering, who having inherited estates, and being desirous to superintend and cultivate their farms, came to the school to learn husbandry, farm-account keeping, the mode of rearing and feeding cattle, and all rural pursuits. The uniform, a blue smock frock, with a straw hat and red ribband, contributed to give an air of rustic cheerfulness throughout the whole establishment.

The crop that appeared to me to be most carefully cultivated, was Beet root, in drills, which produced per acre about seven hundred and fifty pounds of fine sugar, selling at ten pence the lb., as fast as it could be manufactured. The potatoe crop was fine, very well horse-hoed and perfectly clean.

The wheat crop was good, much better than that of the "Breton" farmers around, but foul with weeds,

from not having been made in drills, which I recommended in future, until the weeds were extirpated from the soil. Indeed I ventured to urge the propriety of having all the crops in drills for the same reason. The Swedish, and other turnips were also fine and clean.

There were besides these principal staple crops, experimental crops of nearly 300 varieties, which it is unnecessary to enumerate, though some may become of paramount use to the farmer, such as the giant or red clover "*Trifolium Incarnatum*," which is an admirable supplementary crop when the turnip crop has failed ; I strongly urge farmers to try it, on a small scale first. It may be sown as late as September, and furnishes a prodigious quantity of food in April or May, producing the finest butter possible if given to cows.

The Students attend to the culture of these crops, study their nature, properties, and their effects on cattle, which are daily, nay sometimes hourly, noted.

In turn they are present at all veterinary surgical operations, either on horses or horned cattle, and an explanatory lecture, one of which I witnessed, forcibly impresses on the minds of the Students, the nature and cure, of the disorder.

The Professor of Agricultural implements, for thus he must be termed, demonstrates mathematically the points of greatest or least resistance, in the construc-

tion of all instruments and ploughs, all sorts of which, from the primitive plough of the Lyonnese, a mere beam fifteen feet long with a hook at its end, to the improved Norfolk or Scotch swing ploughs. Most modern implements were to be seen here, the Flemish binot, new harrows, dibblers, drills, horse hoes, winnowing machines, turnip ellicers, chaff cutters, all made up in the College work shops, in many instances by the Students; any such as display a decided taste for mechanics, carpentry, or even smiths works being allowed to indulge it, under the eye of the Professor.

Here then, were a number of intelligent, active, and enterprising youths, all ardent in the pursuit of that knowledge which is the fiat of the most High, collected from every quarter of their beautiful, fertile, and extended country, imparting to each other, a knowledge of its local wants, its various products, its agriculture manufactures, and commerce. All anxiously occupied in the enquiry, what might be most useful and beneficial, to fill and replenish their fertile soil, all desirous to convey to their respective districts the knowledge thus acquired: these youths on their return home, would naturally preserve reciprocal ties of friendship with those whom they might never meet again, but whose correspondence on subjects relating to husbandry and the products which they might exchange, would cement those ties.

Can any reflecting mind deny that such an Institution must prove eminently useful to an Agricultural country? The truth is, that our intelligent and active neighbours have at length perceived and anticipated, that to act in detail and as a divided body, is not the means to attain great results—they have therefore stepped into unity of design, a day before ourselves.

The kindly feeling towards an Englishman, which husbandry generated in these young men, was truly delightful and impressive.

It was no longer the averted eye and scowling brow auguring war and insult, which I witnessed not twenty years ago, but that primitive honest feeling of barter, expressed in these terms. “What will you exchange with us for the new products we shall raise?” you will give us your hardware, earthenwares, laces, and manufactures, in exchange for brandies, wines, and fruits, which you cannot grow in your climate. Such sentiments generally diffused, will do more towards perfecting the amity between these two great nations, whose mutual interest, is peace and commerce, than a hundred formal treaties.

Having shewn I trust, the manifest advantages of an experimental farm, on the other side of the channel, I proceed to shew that it was high time for that class of persons, among the most useful and intelligent, the farmers of this great country, instead of

carrying on experiments in various corners of the empire, experiments which how laudable soever, lost half their value, by being insulated and comparatively unknown, being confined to certain limits ; to rise united in object and design, in order to collect and condense the fruits of all such experiments, sow the seeds of such acquired knowledge, and then scatter it abroad with a liberal hand.

The Board of Trade is an office acknowledged by the Legislature, specially to protect the interest of commerce, and manufactures ; but the Legislature acknowledges no such board specially to protect the Agricultural interest, the origin of both the others.

But the Central Committee of your Society supported by your individual and joint interests, will soon, it is presumed, have its due preponderance, though without directly possessing the means for obtaining information, which an office of the Government would possess ; information of vital importance as appears by the evidence of Mr. Jacob, before the Select Committee on Agriculture, which sat in 1833 : which was adverted to by that Committee, shewing that “ if the bad harvest of 1816 were unexpectedly to arise again, followed by a second bad harvest, there might exist such a deficiency of wheat as could not be supplied by all the world ;” and the Committee came to the conclusion,

“ That the increased supply from Ireland does not

cover the deficiency; and that in the present state of Agriculture, the United Kingdom is in years of ordinary production, partially dependent on the supply of wheat from foreign countries."

"The price of wheat for the last five years, as stated in 1833, notwithstanding several deficient crops, has not in the average exceeded 6ls. 8d. per quarter; the highest price within the same period was 76s. 7d., the lowest 5ls. 3d.

"*Steadiness of price, which is conducive to settled habits, and forms the basis of all fixed engagements, is the primary object never again to be overlooked*; and your Committee cannot fail to remark, that there has been, coincident with the present system of corn laws, a *steadiness* in the price of corn, of which there has been rarely, if ever, an experience in any former period of equal duration; and as during the same period there has been a very considerable difference in seasons, and in the actual amount of corn produced, it is but just to ascribe to the *present system*, a great degree of that *steadiness of price* which has unquestionably prevailed."

I am not exactly aware whether the *present system* which then existed, is the system now, but one thing appears clear that the *steadiness of price*, has strangely vanished; its fall from the lowest quotation of 1833, 5ls. 3d. in two years, being about fifteen shillings per quarter. Hence instability of price having fallen

on the country since that period, some further enquiry ought surely to be made on the causes of this extreme depreciation ; so that inferior lands can no longer be cultivated with any prospect of a return. The Committee further stated “ on the whole, it “ must be admitted that the difficulties are great and “ the burdens heavy, which oppress the landed interests ; but contracts, prices and labour have a “ strong natural tendency *to adjust* themselves to the “ value of money once established, and it is hoped “ that the balance may be restored which will give to “ the farming capital its fair return,” and further on, in conclusion, “ your Committee avow their opinion “ that hopes of *melioration* in the condition of the “ landed interest, rest rather on the cautious forbearance than on the active interposition of Parliament.”

From this it would appear that the agriculturists must rather trust to their own exertions, than hope for any relief from the Legislature, which has so recently been occupied in making, twelve thousand nine hundred and three questions, which with, the replies, occupy 617 pages, on the causes of agricultural distress. It appears therefore doubtful, whether any legislative enactment could speedily relieve those heavy burdens which unhappily oppress agriculturists ; the various interests of the state requiring to be so nicely balanced and adjusted, and being so closely interwoven,

that any concession made to one, might be detrimental to the others. Their ultimate interests are the same, for in all cases of successful industry, either in manufactures or commerce, the first step that is taken by the individual who may have honorably risen to affluence, is to identify himself with the soil, by the purchase of an estate, and what does he then become ? one of ourselves, a farmer !

But the first and most legitimate step, towards relieving the farming interest, is to unite in one great body, steadily to examine, all the bearings of the question that affects its interests : not by merely calling out for help like the cartman in the fable, but by putting a shoulder to the wheel. By rousing energies that have long lain dormant ; by an enquiry into each other's wants ; by the introduction of new plants congenial to the soil ; by the application of capital to the growth of new crops ; by a rapid interchange of commodities, the harbinger to prosperity, which steam communication and railways will facilitate ; by pointing out to the farmer that the soil is not cultivated to its extent ; by clearly exposing that if he grows a crop of weeds in addition to the crop he may have put into the ground, it is just so much produce taken from his capital and given to waste. This holds good with pastures as well as crops ; if nothing but nutritious herbage were grown, another head of cattle would be reared on every farm

in the kingdom, and the increase of stock would be in proportion to the superior culture of the soil.

From whence should such suggestions flow ? From an experimental farm, supported by a well edited paper devoted to Agricultural interests.

In the original prospectus for the establishment of this Society, it was suggested to procure a public building to contain a Library, a Museum, and a Lecture Hall. Now these would be premature and unnecessary, for under no circumstances could they be of the same importance to practical farmers as an experimental farm.

A farmer coming to London would perhaps have neither time nor inclination, to sit down in a Library, or look round a Museum, nor would he derive much information from a view of them. Not so with the farm of which the following is an outline of the plan.

It should be from two to four hundred acres, in the neighbourhood of London ; it is not improbable some patriotic person will offer such a piece of land to the Society. It should be under the management of a Director, assisted by a Professor of Agricultural Chemistry, who would also teach farm account keeping, and land surveying. A Veterinary Surgeon, and an Implement maker *might* be attached to the institution.

The School connected with it should receive one or two youths from every county in the Kingdom,

from sixteen or eighteen, to twenty years of age, at fifty pounds a year. These would receive instruction in the science of agriculture, and in practical husbandry, and perform work in the manner which I have described. None should leave the School without permission ; the infraction of all rules should be punished by fines, to go to a stock purse, to be awarded in premiums. A third repetition of fines should involve expulsion.

As a check, all payments should be made half yearly in advance, with a deposit, as a security for good conduct.

Premiums for the best Essays on Agricultural given subjects, also for the most expert performances, either in ploughing, sowing, or other operations, should be annually awarded by the President, in presence of the Board and Members ; certificates of scientific, or practical knowledge should be given to successful competitors.

The buildings connected with the farm, should be of an entirely plain, unostentatious character, constructed solely with a view to perfect usefulness, and economy, suited to become models for larger or smaller farm yards, either experimental or private. The house for the Director, should be such as a gentleman of small fortune would build for himself,—this should be so situated, as to overlook the farm yard from his bed room and study.

On the proper selection of this individual, much would depend, he should be a thorough practical farmer of good education, entirely devoted to the pursuit of Agriculture. A gentleman of unimpeachable integrity and character, so as to have a positive moral influence over the young men ; a few practical paid labourers and servants should be attached to the farm, to instruct the students in the manual operations of husbandry.

One wing of the farmery should be destined for the cattle, horses, cows, and pigs, the whole drainings from whose stables should run into tanks, for liquid manure. The opposite wing should form, below, a repository for all sorts of machines or implements relating to husbandry. Two of the leading machine makers in London, have already declared that they would be happy to send one of each of their instruments to such an institution. The country machinists of talent would do the same ; all should be tried when required by the Director or Board. Here would be practical information to gain, a farmer coming to London for a day or two would not have to do what has occurred to myself, lose much time in going to all the implement makers, to see the best winnowing, or drill machine, but he would at once compare their merits and know their prices.

Here it may be excuseable to use a colloquial style. He requires a winnowing machine that will clean

corn fit for the market at one passing. Here it is—I should like to be convinced of the fact by seeing it work. Send to the barn for a bushel of wheat in sheaf, there would be demonstration. A chaff cutter, a turnip slicer, a drill, a horse hoe, a grubber, all could be shewn to a farmer wishing to purchase them, by practical use; there he would gain time and experience, and would be correctly informed as to the comparative and real merits of each instrument.

Here, economy and simplicity, in the construction of all implements of husbandry would be pointed out, and insisted on; most of these are too expensive for farmers; of what avail is it, if none but the really wealthy can purchase a drill machine. Few farmers can afford to pay twenty or thirty pounds for a complicated instrument, which, on his leaving home may be put out of order to the entire overthrow of his plans, substituting in their place, loss in the distribution of time, cost of repair, vexation and disappointment; but if such instruments were made at a cost of five or six pounds, simple and strong, regular in performance, not liable to be put out of order when fairly used—they would be a great saving to a farmer.

The experimental farm would force these accommodations.

Over the repository should be a committee room, a library which would be filled in a month by volun-

tary contributions, with volumes now lying neglected on a thousand shelves, besides, rooms for seeds and other purposes.

The school, lecture room, and dormitories, should be in the cross wing, and thus enclose the farm yard.

The like practical knowledge and information would be obtained from an inspection of the crops.

What are these boards and notices ? *Read*—Half an acre of Swedes manured with soot ; do. with lime ; do. with sea weed ashes ; do. with salt ; do. with decomposed manure ; do. with fresh manure ; do. with liquid manure ; do. with bone dust. Similar experiments to be made, and explained as above, on wheat, barley, potatoes, and on all the staple crops of the country. The unknown or new crops to be tried on a much smaller scale, but all explained as above, so as to enable a farmer to make his own notes or remarks on them.

It is obvious that no individual could conduct such a series of experiments with advantage, it requires some capital to support losses, that must ensue on uncertain experiments, a joint stock, where losses common to all would be unfelt, but the benefit gained by all, considerable by the certain information obtained ; of which a report should be published, either monthly or quarterly, in the cheapest possible form. An exact account of all disbursements and receipts should be submitted to the Board half yearly.

I may be pardonable to say a little on the subject of wheat. It is the surest test of a farmer's skill, if he usually raises a better than an average crop, his previous cultivation must have been judicious. It is that plant which has most engaged my attention, as the most useful to man.

Several of the deputies from the various associations and others, did me the honor to examine the one hundred and three varieties of wheat, which I laid on the table of your committee, 72 sorts of winter wheat, and 31 of spring wheat.

Four years of close application and careful comparison, have given me a knowledge of important properties in wheat perhaps generally unknown. I shall merely give an outline of my researches, reserving my entire views on the subject for a future communication. Professor La Gasca, curator of the Royal Gardens at Madrid, well known as one of the first botanists of the age, who had devoted twenty five years to the classification and study of wheat, as a plant, had done so theoretically, he had not had leisure to study its properties as a nutriment, to him I owe a great and lasting debt of gratitude, which I am rejoiced thus to acknowledge. Four years since I accidentally saw with astonishment and pleasure, about eighty distinct sorts of wheat growing in a nursery garden in Jersey, some seven feet high, some only four, the ears of some three inches, others six.

The Professor, whose they were, happened to join me, and though a stranger, he politely explained their qualities to me.

I requested him to come and visit my crops, the following day, which I considered as pure, at least as unmixed, as those of my neighbours, when to my dismay he drew from the fields three and twenty sorts. Some were white, some red, some liver coloured, some spring-wheat, some dead ripe, shaking out, some riper, some in a milky state, and some green. I immediately became convinced that no crop in that state, could either produce the greatest crop of corn, give the largest quantity of flour, make the best or lightest bread, such, as would be produced from a field all in an equal and perfect state of ripeness.

I directly conceived a plan to endeavour practically to ascertain the relative productive sorts of wheat. I requested Professor La Gasca to shew me those which he considered as the best.

He pointed out fourteen sorts—these I grew with extreme care, noting their time of appearance, the number of deaths, or grains that failed—their tillering, flowering, number of ears, weight of straw, and produce of corn, flour, and bran, both separately and relatively. There is full three week's difference in the ripening of some of them, time enough to insure a regular succession in sowing them.

When the Professor saw the drift of my experi-

ments, he exclaimed, "Is it possible that in one twelvemonth you have practically obtained the knowledge of what I have been five and twenty years in studying; but persevere with diligence and courage you will yet work some great benefit for your country and for the world."

I did ascertain that even among those 14 sorts, pointed out to me by my learned friend, he was not aware of their relative properties, from his having recommended me one so inferior that it produced only one pound ten ounces of wheat, whereas another, from an equal number of grains, produced four pounds four ounces. I found that the average of tillers of the first was only six, I think, for I am writing from memory, my books being in Jersey, and the latter sort eleven; being nearly double the quantity of straw, and more of wheat; hence, the crop of one sort might be ruin to a Farmer, whereas the other would be comparative wealth.

I have raised fifty-two imperial bushels the acre of two varieties this year, as a crop; but, experimentally, I have raised seventy-two by garden culture. From one of those sorts, I have made twenty-five pounds of fine white bread from eighteen pounds of flour. Some of the London bakers inform me that no Dantzic, or Essex wheat will do that. From a single ear I have raised a sufficient quantity in three years to sow four acres of a pure unmixed variety, of

great produce, both in straw and wheat. Some good Farmers mix the best varieties of wheat, in order to insure, what? half a crop at least. Now as their intelligence has led them to discover that some sorts perish when others live, what is the remedy?—to ascertain the precise sorts that are suited to the soil and climate, and thus insure a full crop. It must not be supposed that all soils will grow white wheats; some of them are so tender, that their culture would be a sad failure, but there are pure sorts of red, or yellow, or liver colored wheats, that will afford under Providence certain and remunerating crops in poor soils. This is no rash opinion, the truth of it will be proved in time. The bounteous Giver of all good, has so beneficently adapted this wonderful and important plant, to all soils and climates, that it flourishes in snow clad regions, or on sun burned plains. Hence even with the most careless culture, it affords food for man; but surely this is not all that may be expected from civilized—from scientific man?

May it not be permitted Him to discover and select those sorts which may be precisely suited to each climate and soil, and thus excepting the influence of unpropitious seasons, almost ensure a full crop.

May it not be questioned if that beautiful round, plump, thin skinned white wheat, found among the “Dantzic high mixed” as it is called, be not the result of the observation and sagacity of some intel-

ligent Polish or German farmer? It is scarcely to be believed that it is owing solely to the effect of the soil and climate. The very term "high mixed," infers that it is grown pure, but then, it is too good for our market, so a little alloy is mixed with it, luxury demands a portion of it, so a small quantity of inferior corn is made to pass with the finest, and it arrives here as "high mixed," "second mixed" or "inferior mixed." A cargo of pure, white wheat is unknown. Nevertheless there is cause to be sanguine that English farmers will grow such, and that biscuit bakers and pastry cooks, will pay them, the highest prices, and not to the farmers of Podolia and Volhynia. Several gentlemen have declared, that they would readily give a guinea a bushel for seed, of such pure wheats, as would suit their soils.

Since this statement was commenced, I have received an offer to establish a private experimental farm which would supply such seed corn; I have no private object in view; my desire is the support of English farmers for this proposed establishment, and that their experimental farm, should supply them with pure wheats at their own price. The knowledge and all samples, that I possess, shall be cheerfully contributed to it. Here would be a nucleus, a pivot to work from. It should be near the metropolis, for obvious reasons, such as facility of printing, and conveying knowledge, superinten-

dence by the Board, ready inspection. It would be a neutral ground, where men of all parties, or political creeds might join, here might be laid to rest on Committee days, and General Meetings, all the angry passions, and their concomitant evils. Let the yeomen unite with the gentry as the true children of the soil, and rally round their Sovereign as the first of its farmers, and "union will prove to be strength."

It is a subject which appears to be sufficiently important, to awaken the attention, and engage the support, of His Majesty's Government, as it might greatly increase the income of the empire, considering it only as a matter of pounds, shillings, and pence, the risk is not great, as may be seen by the following statement.

There are 111 countries in the United Kingdom, but suppose that only 100 of them sent a student to an experimental farm—say of 200 acres, its income might be as follows :—

One hundred youths at a charge of £50 a-year each, would produce £5000, their labour estimated at six-pence a-day each, would be £750 more. Fifty acres on a four course shift, in pure wheat, to be distributed as seed, at forty bushels the acre—or 2000 bushels at ten shillings would produce £1000 a-year more. All the other crops being near the capital may be supposed saleable and estimated at another £1000, which altogether would present an income of nearly £8000 a-year. Then deducting there-

from the rent of 200 acres, at £5 a-year, per acre—cost and tuition of each student, £50 a-year; interest on outlay for buildings, stock, £1000 a-year, in all £7000, would leave some profit to the farm.

In addition would be an income, arising from casual visitors, who should pay for admittance. Experiments might also be carried on for the improvement of stock by crosses with foreign animals, either cattle, sheep, or poultry, through the favor and with the assistance of the Zoological Societies; these might occasion further profit.

I cannot close this statement without congratulating the farmers of this great country on the formation of this auspicious Society. I view in it, the dawn of that important day, when “the Sword shall be turned into a Ploughshare, and the weapons of war into pruning hooks.” It is perfectly true that in no other country have persons of wealth and liberality carried on to the same extent, the multiplied and varied experiments that have been witnessed in England; but it is no less true, that with a few exceptions, such as the splendid enquiry into the nature and properties of Grasses by the Duke of Bedford, under the direction of Mr. Sinclair; the admirable labours of Sir John Sinclair, and a few others, no positive body of information as to the results of series of varied experiments, has ever been made known; hence the researches of many patriotic and liberal labourers in

Agricultural knowledge, have either been confined to the circle of a parish, or perhaps to that of a county. It is therefore, highly expedient that the results of such investigations should be collected and published in the most acceptable form, and that analogous experiments should be conducted at the experimental farm, in various soils collected there, for the purpose of verifying former experiments by additional proofs. When England leads the way for good, all other nations will follow. If the affairs of this noble institution be conducted in pure singleness of heart and purpose, solely with the view of promoting the common interest of Agriculture, its prosperity will be sure, its duration permanent. If, on the contrary, selfish or party views should creep into its administration, it will languish, and speedily fall into decay. I conclude with the emphatic words of the Great Prophet.

“ Give ye ear, and hear my voice ; hearken, and
 “ hear my speech. Doth the ploughman plough all
 “ day to sow ? Doth he open and break the clods
 “ of his ground ? When he hath made plain the face
 “ thereof, doth he not cast abroad the fitches and
 “ scatter the cummin, and cast in the *principal wheat*
 “ and the appointed barley, and the rye in their
 “ places ? ”

Trusting that I have ensured your support ; as an

earnest of my sincerity, I beg to offer a donation of five pounds towards the experimental farm, and subscribe myself,

With great truth and respect,
Your much honored, and very faithful humble
servant,

J. LE COUTEUR.

FINIS.

Cambridge University Library,
On permanent deposit from
the Botany School

